RAILROAD GAZETTE

FRIDAY, JUNE 30, 1899.

CONTENTS.

ILLUSTRATIONS:	PAGE
Locating the Cut-off and Other Events on the Locomotive Indicator Cards	468
The Allen Valve for Locomotives	470
New York Central Moguls in 1889 and 1899	470
CONTRIBUTIONS:	
Pressed Steel vs. Composite Freight Cars.	463
EDITORIALS:	
The Atbara Bridge	474
The Right to Route Your Freight.	474
The Financial Situation	476
EDITORIAL NOTES	474
New Publications	476
Trade Catalogues	476
GENERAL NEWS:	
Locomotive Building	479
Car Building	479
Bridge Building	479
Meetings and Announcements	481
Personal	481
Elections and Appointments	481

GENERAL NEWS:	PAGE
Railroad Construction	482
General Railroad News	481
Traffic	484
MISCELLANEOUS:	
Technical	477
The Scrap Heap	478
Meeting of the American Railway Master Mechanics' Association.	463
The Crescent Ship Yard	467
Captain Evans at the Master Mechanics' Convention	469
The Civil Engineer in France	469
Excursion Rates as a Source of Revenue.	471
The Beginnings of American Engineering.	471
Railroads in Jamaica	472
Some Notable Exhibits	472
International Association of Car Accountants	473
Convention of Car Service Managers	473
Train Dispatchers' Association Convention	476
The Railway Transportation Association	477
The Kinetic Motor	477

Contributions.

Pressed Steel vs. Composite Freight Cars.

New York, June 26, 1899.

To the Editor of the Railroad Gazette:

In your issue of June 9 appears a description and illustration of Mr. Canda's car of 100,000-lbs. capacity composed of wood and metal. I have spent much thought on the subject of freight cars of large capacity composed entirely of metal, and in reading this article was struck with some of the statements as being entirely at variance with my preconceived opinions as to the relative value of a composite structure of wood and metal as compared with one built wholly of metal; and, as the writer of the article well says, "the choice of wood as the material of construction will strike some engineers as remarkable." He says further: "In tensile or bending strength, weight for weight, wood is the strongest material known in the arts."

Trautwine gives the average weight of yellow pine (which is the timber generally used in cars) as 55 lbs. per cubic foot, and the weight of steel as 490 lbs. per cubic foot. Let us see what is the practice of reputable engineers. The Bureau of Building Inspection of Philadelphia allows for good yellow pine a maximum strain equal to 1,500 lbs. per sq. in. This is probably a fair sample of the allowance made by cities generally. The Pencoyd Bridge & Construction Co. allows a maximum fiber strain in steel bridge pins of 18,000 lbs. per sq. in. or more, which is about the usual practice. This is equal to a ratio of 12 to 1. Taking the average weight of yellow pine as 55 lbs. per cubic foot, and the average weight of steel plate as 490 lbs. per cubic foot, we have the ratio of 9 to 1, while the ratio of resistances was 12 to 1, which thus leaves a margin in favor of the steel car of 12 divided by 9, or 33 per cent.

These figures represent the relation which exists with static or semi-static loads. Where heavy shocks are encountered, such as occur when operating freight cars, the strains ought in no instance to exceed 14,000 to 15,000 lbs. for steel and 1,050 to 1,150 lbs. for wood, leaving the relative proportion as above stated. This 33 per cent. would mean a saving of 33 per cent. in weight of a steel car as compared to an equally strong wooden car of same capacity, if equal increments in weight meant always equal increments in strength—a supposition, however, which holds good only for a material when exposed to plain tension and compression. Where flexure or bending occurs, this relation is changed, as exemplified in a sill where twice the height gives twice the weight, but four times the strength. Assuming 75 per cent. of the material in any car to act in the function of beams, the saving in weight would thus be represented by:

¼ of car at a rate of 33⅓
¾ of car at a rate of $100(\sqrt{1.33}-1)=16\%$, which for the three separate quarters gives..... 48%

Total percentage for 4 quarters..... 81
or average percentage for whole car $\frac{81}{4} = 20\frac{1}{4}\%$

In the above calculation it has been assumed that the wooden structure is so designed and constructed as to actually produce the equal of the steel design and construction for withstanding vertical strains and concussions, a condition, however, which in practice is impossible to obtain, for reasons given later on.

Applying this calculation to a freight car of 100,000-lbs. capacity as described in the article referred to, weighing 33,100 lbs. (the weight given) when built of wood: If built of steel, according to the above calculations it would weigh 20¼ per cent. less than 33,100 lbs., or 26,397 lbs., the difference being 6,703 lbs. in favor of steel, strength for strength. As only about three-fifths of the composite car is wood this difference would be reduced accordingly. This percentage of saving in weight really is much greater as the nature of steel renders it possible to make the joints and connections so that practically the theoretical values of the metal can be obtained, while in a composite construction of wood and steel the joints cannot be connected so as to get anything near the theoretical value, and furthermore the integrity of the structure cannot be maintained, due to the shrinkage of the wood, loosening of bolts, and the general deterioration which occurs. This is a well known fact and does not admit of argument. The force of this point is accentuated by the fact, stated in the article in question, that "the weight of the car is as low as 33,000 lbs., but after a run of 90 days they will season out to 32,000 lbs." This means, if it means anything, that the wood shrinks, and in turn the joints are affected, undoubtedly. As to whether a composite car 40 feet long, weighing 32,000 lbs. and of 100,000-lbs. capacity would be thoroughly substantial and strong enough to resist hard service, the writer would not care to hazard an opinion.

Quoting further from the article: "In a steel structure like a car, the question of repairs after accident must be faced. Some railroads that have used metal cars for years have found by experience that the cheapest way, and in fact the only way, to repair a metal car injured in accident, was to cut it up and treat it as raw material." On this point it is of importance that no loose statements should be made. The Pressed Steel Car Company has running 6,000 steel cars, practically all of them of 100,000 to 110,000-lbs. capacity. There have been several severe wrecks on the roads running them. In each case a careful record has been taken by the Pressed Steel Car Company and the cost of repairs has been noted. These investigations show that no single car has been damaged beyond repair and that these cars could be repaired without expensive machinery. The total cost of repairs to 6,000 cars during the last two and one-half years has been less than $2,000, and the ordinary repairs, aside from wrecks, have been practically nothing. From this it will be seen that the cost of repairs from wrecks has been about one-twentieth of one per cent., or 33⅓ cents per car, a sum too insignificant for consideration. This experience should be an answer to any criticism regarding cost of repairs, or ability to repair this class of cars when injured in wrecks. So low a cost has never been equaled in any other design.

Your article further says that the use of pressed steel in any form has been avoided as much as possible, in the car as well as the truck. Erroneous ideas might be gotten from this statement by the casual reader. There are two fundamental points which can be taken advantage of in building a car of pressed steel and which can only be accomplished economically by this process, namely: (1) the making of the parts entering into the structure of theoretically correct shapes to obtain the maximum strength with the minimum weight; (2) the reduction of the number of parts and number of rivets to a minimum. It is a maxim in sound engineering that a reduction in the number of parts of a structure is always desirable. The reduction in dead weight in a vehicle requiring the expenditure of power to move is now unanimously conceded as being a source of continuous revenue in operating. In the process used by the Pressed Steel Car Company every pound of metal outside of theoretical lines is eliminated as far as possible from the structure; as is evidenced by the fact that about 2,000 tons of scrap plate steel are made monthly by the Pressed Steel Car Company due to the cutting away of all metal which would not add to the strength of the car. Experience has demonstrated that, as compared with a car built of structural rolled steel, there is a difference in favor of the pressed steel, strength for strength, of about 11 per cent., or, say, in round figures about 3,500 lbs. per car. Considerably more than this is obtained as compared with a wooden car of equal strength and capacity.

The best engineering talent of the leading trunk lines have conceded this as a general proposition, with the result that cars built entirely of steel have been ordered in large quantities, and in order to fully take care of all the business of this class the Pressed Steel Car Company has in course of construction an additional plant which will give it a capacity for building 25,000 cars annually.

CHAS. T. SCHOEN.

Meeting of the American Railway Master Mechanics' Association.

The thirty-second annual meeting of the Master Mechanics' Association was called to order at 10.15 A. M., Monday, June 19, at Old Point Comfort, Va. Mr. Joseph Bryan, President of the Richmond Locomotive & Machine Works, made the opening address and, among other things, called attention to the desirability of having a few standard designs of locomotives for different kinds of service. Mr. W. S. Morris replied for the Association.

Mr. Robert Quayle in his address, as President, referred to the satisfactory condition of the Association, both as regards to membership and finances. The following is extracted from Mr. Quayle's remarks:

Since our last convention we have seen a very marked advance in the weight and power of locomotives, both passenger and freight. More powerful locomotives are necessary, and yet the track must not be made to suffer; and this, I believe, may be accomplished. We may need to increase wheel loads somewhat, but by using larger driving wheels the counterbalance weights may be made even less destructive than small wheels with lighter loads. We ought to build engines that will haul at least 2,000 tons on grades of from 0.6 to 0.7 of 1 per cent., and instead of driving wheels of 55 inches for road engines, on lines with ruling grades less than 1 per cent. we ought to use 60 inches. On such roads, by increasing train loads from 1,500 to 2,100 tons, we ought to save not less than half the cost of the heavier engine per year.

The greatest possibilities in saving, by the use of more powerful locomotives, are in the wages of engine and train crews. The expense of running a freight train for trips of about 100 miles at ten miles per hour, which is uniform regardless of weight of train and the grades, is about $22. The cost of coal will be less per ton mile for heavier trains, but it is this constant charge for crews which affects the saving when their number is reduced. The labor cost at the round-house will be somewhat greater per engine mile, but when compared on the basis of ton miles it must be less, even when the labor of wiping is included. The wages of engine dispatchers are the same for heavy as for light engines, but since a smaller number are required for a given amount of work, this expense should be less with those that are more powerful.

The saving in coal is next to that of labor, and within the proper limits of the capacity of the engine and of speed, the heavier the train the less coal is required per ton mile. This argument applies to the loading of engines, whether heavy or light, but its force is greatest in connection with very powerful locomotives. This may be demonstrated by coal reports kept for relatively long periods. It takes more oil to lubricate a heavy engine than a light one; but this, too, should be referred to the ton mile, when it appears as a saving in spite of the great increase in steam pressure and the dimensions of journals. The same holds true in regard to the cost of repairs. They also will increase, but not in proportion to the additional work done. With two engines operating on the same grades, one built to haul 600 tons and the other 900 tons, the relative total cost of operation per 1,000 ton miles may be taken as the ratio of about 47 to 36, or a difference of about 25 per cent., or more than is usually expected from compounding.

The tendency toward heavier loading has been favorable to compounds, because of the possibilities of greatly increasing their pulling power at critical points on summits by the use of live steam in the low-pressure cylinder.

The possibilities of lightening parts by the use of improved material, whereby capacity may be increased without increasing weight, should be utilized to the utmost. Larger boilers may be built without increase of total weight, and we may be encouraged in this by the great improvement of recent years in marine work.

It would take too long to do more than partially enumerate the directions in which we may improve locomotives. The following need our attention: The reduction of waste power of the cylinder by reducing back pressure and condensation; piston valves; feed water purification; the forms of fireboxes and other factors tending to reduce staybolt strains and failures; more thorough lagging of the boilers at the sides and front of the firebox; the further use of cheap fuels and care in the matter of details which will prevent engine failures on the road. All of these subjects are before us and all of them give promise of good returns for the time and money spent upon them.

The distribution of power in shops needs thought. We have electricity, compressed air and also the gas engine to aid us, and I predict that after ten years we shall look back with surprise at the prevailing shop power methods of the present. We need more power cranes and more modern and powerful tools. We must give more attention to the cost of work and to those commercial methods that make success or failure in manufacturing establishments. The welfare and comfort and the surroundings of our men, both on and off duty, interest us now, but much more ought to be done in these matters in the lines of reading rooms, places of recreation and in providing lectures, instruction and entertainment. We should use the technical papers intelligently. It is a good plan for the head of the motive power department to mark articles and send them to the master mechanics and such other employees, as they may deem wise, asking for comments and suggestions.

The report of the Secretary showed that the membership of the association is 653, as follows: Active members, 609; honorary members, 26, and associate members, 18. Seven members have died during the year. The balance of receipts over expenditures during the year was $902.81. The Treasurer presented a report showing that the Association had cash on hand amounting to $3,116.94.

Joint Meetings.

Mr. J. H. McConnell (Union Pacific).—The Executive Committee of the Master Mechanics' Association met the Executive Committee of the Master Car Builders' Association in Chicago, and it was decided at that meeting that they would recommend to the two associations that the time of the meetings be changed in order to have them inside of four days. This matter was presented to the Master Car Build-

ers' Association last week, and the recommendation of the Master Car Builders' Association was that it should meet on Monday and occupy the three days, the Master Mechanics' Association to meet on Thursday and occupy the balance of the week. The matter was referred to the Executive Committee of that Association, to take it up with the Master Mechanics' Association.

This, upon motion, was referred to the Executive Committee with power to co-operate with the Executive Committee of the Master Car Builders' Association.

Mr. J. H. Leeds, an Associate Member, was elected an Honorary Member and the following were elected Associate Members: Prof. R. A. Smart, Strickland L. Kneass and Clement F. Street.

Topical Discussions.

The comparative efficiency and economy of metal flexible joints versus rubber hose for steam-heating connections.

Mr. A. W. Gibbs (Pennsylvania RR.).—I have availed myself of some records of [Moran] flexible joints, which we began to use about 1892. At that time the maintenance of connections between our engines and tenders became troublesome, on account of the oil which was thrown from the driving wheels, and it gave us a great deal of trouble by destroying various kinds of flexible hose which were not adapted to resist the action of oil and heat. We finally adopted flexible metallic joints, which we now use wherever we have to convey steam between engines and tenders. I find that since 1893 we have bought about 2,900 joints, for 750 engines altogether, being equipped on all of the lines. There appear to have have been about 25 failures from various causes. These joints are now used entirely for the purpose mentioned, partly because they resist the action of oil, which destroys other material, partly because there is no possibility of bursting, which is very awkward on a through train, where you cannot afford to stop, and partly because in our steam heating system we have to carry very heavy pressures between the engine and tender, in order to operate a vacuum pump. Ordinarily you do not have to carry much more than 40 lbs., unless you are running a dynamo in the baggage car; but we are practically running a separate engine, all the time on our passenger trains, because we have a vacuum pump in our tender. I can only say that we have used this number of Moran joints, and appear to have a little over two dozen failures since 1893. While the first cost is greater, there are places where you cannot afford to have a failure even at the expense of greater first cost; that is, you can afford to pay a considerable amount to avoid failures in certain important places. After mentioning the good points, I would say that the principal trouble so far has been that when the joint is not in use, when you do not have steam pressure on the pipe system, it is injured by dust and by rattling. The remedies are to either keep pressure on all the time, or else disconnect the joint in the summer when you are not using steam.

Mr. Frank Slater (Chicago & Northwestern).—My experience has been somewhat limited as to the number of these joints in use. The experience we have had has been very favorable. We have had no expenses connected with the joints when properly applied in the first place. In the first engine on which the joints were applied they were placed considerably to the side of the engine, making a great deal of motion when rounding curves, and they wore out in about six months. Since then they have been placed directly in line with the drawbar, and they show no wear to speak of, and I have every reason to believe they will last a long time.

Mr. A. E. Manchester (Chicago, Milwaukee & St. Paul).—We commenced last fall applying the Moran joint to a number of our passenger engines that haul dynamo trains. We had had a great deal of trouble with hose connections due to the high pressure steam and the excessive motion, with our overhead system between the engine and tender. The experience thus far has been entirely satisfactory with the Moran joint. We have had no failures whatever, and there have been no cases of leakage. We are putting on more of the joints. The question of cost is considerable when compared with the hose connection, but after looking over our record of cost to maintain the hose connections, we came to the conclusion it would be a very good investment. We found that with dynamo trains we were using about 7 or 8 hose a year, to maintain the service between the engine and tender, with occasional delays occurring on the road by the failure of the steam. We believe the Moran joints are very satisfactory. The joints come recommended in such a way that we get a three years' guarantee on them, which of itself is something of an object.

Mr. R. H. Johnson (Atlanta & West Point).—Though not having had such an extensive experience as some have just claimed, we have been using steam heat for the last three years, and we have had a trial of metallic pipes and other connections, and our experience has been the reverse of that mentioned on the floor, as we find that the joints wear out very rapidly. They were placed, as mentioned, in a line with the center of the cars, to prevent as much as possible any lateral motion. Our experience with hose has also been rather unsatisfactory.

To what extent and with what success have the recommendations of the Committee on Exhaust Nozzles and Steam Passages been adopted?

Mr. A. L. Humphrey (Colorado Midland).—We find that by increasing the steam passages and arranging them as has been recommended, we do away with the back pressure to such an extent as to give freedom to the locomotive, which is of great importance. We find that by the arrangement suggested by the Committee that we have a softer exhaust, so that it does not work so severely on the fire, and at the same time permits of an easy free steaming engine. By working the soft exhaust it makes it easier on the tubes of a locomotive, easier on the firebox and easier on the fireman's back, which means considerable in the saving of the coal pile. I believe that I can say without fear of contradiction, that among the several recommendations which have been made before the conventions in the past, none has been more universally adopted and with greater success, than the recommendations made by this Committee in 1897.

Mr. C. H. Quereau (Denver & Rio Grande).—In connection with this subject before another Association, I have received 21 replies from a number of railroads in the United States and Canada, and of that number there are seven roads which do not use the Master Mechanics' design; four report that the Master Mechanics' design is as good as their standard exhaust pipe and front end arrangement; four report good results but no marked improvement, and six report a decided improvement. The majority of these replies were received from railroads which are commonly called small, and not from large trunk lines. As far as the Denver & Rio Grande is concerned, we have 25 locomotives on the First Division, equipped with the Master Mechanics' design. Although there has been no marked gain in fuel economy, the diameter of the exhaust tip has been increased and an interest developed both among the firemen and enginemen in light firing.

Mr. Robert Miller (Michigan Central).—The Master Mechanics' recommendation as to exhaust nozzles is standard with the Michigan Central road to-day. I think we have about twelve diamond stacks on the road and we are going to get rid of them as soon as we can.

Has not the time arrived when air-brake instructors can accomplish more by instructing those who maintain brakes how to maintain them, than to instruct those who use them how to use them?

Mr. R. W. Bayley (Westinghouse Air Brake Co.).—I think it very proper to teach not only how to repair brakes but how to operate them. There are those who have to maintain them, and there are those who have to operate them. Each of them occupy a different sphere. We take the inspector and tell him how to repair brakes, but we do not bother to tell him particularly how to operate them, because he is not in a position to do that. The enginemen and firemen we do tell how to operate them, while it would be a useless task as a rule to tell them how to maintain brakes, because they are not required to perform work of that character. This course of instruction is carried out in our air-brake instruction car, namely, the engineman is taught to manipulate the brakes, while the inspector, on the contrary, is taught how to maintain them. To add to the instructions of the engineman, how to maintain brakes, and to the inspector, how to operate them, is an entirely unnecessary proceeding and is a waste of time.

Mr. J. F. Deems (Chicago, Burlington & Quincy).—It should be remembered that those who use the air brakes are constantly changing, the men come and go, and, not only that, but those who are using the brakes daily, overlook a good many things that are told them by the instructor, and it seems to me quite important that their memory be periodically refreshed by visits from the air-brake instructor. Any disposition to reduce the number of the visits from the air-brake instructor, or that the air-brake instructor should relax his vigilance amongst those who use the brakes, would be a dangerous experiment.

Mr. J. L. Lawrence (Cumberland Valley).—I think you will find on a majority of railroads a class of men who have now to deal with the maintenance of brakes, that are practically the same class that repaired freight cars. I think we should look for a partial solution of this question by placing in these positions wherever an opportunity presents itself, better men, even if we have to pay them better wages to maintain the air brakes. I, for one, would be very sorry to see the air-brake instructor taken away either wholly or partially from those who operate brakes, and give attention to those who maintain them.

Mr. H. J. Small (Southern Pacific).—I move that it is the sense of the Association that the time has not arrived when we can abandon the instruction of those who use the brakes, but that it is very proper that more care should be given to the maintenance of brakes than has been done heretofore. Carried.

When double-headers are used on passenger or freight trains, is it good practice to cut out the brakes on the head engine, and does this comply with the requirements of the law?

Mr. T. R. Browne (Pennsylvania RR.).—I have not been able to determine that there is any particular law governing the requirements in these cases. On the Pennsylvania RR. the provision at the present time is that the head engine shall do the braking, except as to the application of the emergency stop, and the engine next to the train shall be cut off. This condition is somewhat altered on the mountain division, where double-headers are used for a short distance only, and under these circumstances the engine next to the train controls and applies the brakes. There is hardly any necessity for applying brakes in going up hill. As to the advisability of this matter I do not know that I can state it from my experience. It would appear to me, however, that the head engine being in the lead should have the ability to apply the brakes, as the crew is in a position to see all the signals, as well as the second engine. It seems to me that to cut out the head engine entirely removes to a certain extent the possibility of throwing a part of the responsibility on that crew and throws it all upon the engine behind. From the standpoint of my experience and judgment in that matter I would naturally feel inclined to say that both crews should have it within their power to apply brakes, especially on double-headers, which usually means a heavy train.

Mr. C. H. Quereau (Denver & Rio Grande).—The practice with us now is to cut out the driving brakes on the forward engine and leave the control of the brakes of the entire train with the forward engineman. The braking power of the head engine is such that there is no fear of a collision.

Mr. A. W. Gibbs (Pennsylvania RR.).—What I think Mr. Browne did not clearly state was that the arrangement of the engineer's valve permitted the engineman of the rear engine only to apply the brakes. It was expressly arranged that he would not be able to release the brakes, for the reason that should the forward engineman discover the necessity of applying the brakes, while the engineman of the second engine had left his brake in a released position, the result would be a brake failure. Therefore the brakes with us are so arranged with double-headed passenger trains, that the forward engineman has control not only of his own brakes and the train brakes, but also those of the rear engine; the rear man not having the power to release.

"A Research Laboratory Under the Control of the Association."

Mr. R. P. C. Sanderson (Norfolk & Western).—I cannot altogether agree with some of the recommendations, nor with all the deductions made by the Committee. In the first paragraph reference is made to the need of this laboratory. It seems to me from my way of looking at it, that the need as stated there points towards exactly the contrary proposition. The harder the experiments and the more difficult the development becomes, the greater is the need of specialists. No man in charge of a research laboratory can possibly be a specialist. A general research laboratory might have its uses, but the demand is far greater for special lines of work by men especially suited for it.

In regard to the routine work, there I think is the line along which the Master Mechanics' and Master Car Builders' Associations could work to great advantage. Why not extend that idea? Why not have a bureau for analyzing and testing material? In this way the small road will have the advantage of laboratory work at a stated charge which will just cover the materials required in the test. It does not mean that the large railroads shall give up their laboratories, but it gives the small roads an opportunity to follow out the work in the same line, so that they can buy material on specifications and have it tested with the assurance that they are getting what they want. I personally am opposed to forming any such bureau as recommended here for research.

Mr. F. A. Delano (Chicago, Burlington & Quincy).—I should be in favor of the resolutions contained in the report which put the matter in the hands of the Executive Committee for further consideration and report next year. I am inclined, however, to agree with what Mr. Sanderson said that the conclusion of the Committee is a mistake. It seems to me there is some danger of getting a centralization in research work. At the present time something like 75 or 80 per cent. of the mileage of the country is represented by 10 or 12 large railroad systems. Each one of these large systems has a more or less perfect organization for investigation and testing materials, and it seems to me that is quite as few as there should be in a country of this size. I think it frequently happens that more than one man is right, even though he may have diametrically opposite views from other men, and there is a chance in putting this research work under one head that there would be too great a centralization and some General Managers might say in contributing to the support of such a central organization that we must defer to their notions and conclusions or else they will stay out.

Mr. Angus Sinclair.—This question has been before the Association more or less for the last 15 years. There was a very active effort made in its favor at one time, but every time a decided effort of that sort

was made, the good sense of the members came up so strongly that it was voted down.

Mr. J. N. Barr (Chicago, Milwaukee & St. Paul).—I think this Committee has done a good work, but it is ahead of the time. I think it will come. I believe research laboratories of this kind will come, but do not believe we are ready for it now. I believe that the research laboratory will do more than anything else to wipe out a certain narrowness of opinion and establish the fact that while we do not all do the same thing we are all doing in our situation about what is right and I believe that is pretty nearly true, although we make mistakes. It would also establish the fact that when there is a decided advantage in all of us using the same thing, we would have the necessary information to do it. I am not ready to sustain the idea that this is a dead question.

Mr. G. R. Henderson.—Mr. Sanderson spoke of the fact that it would be very difficult to obtain a specialist who would be a specialist in all cases. That is very true. On page 5 of our report it is stated that the Director of Research would have it as his special duty to know where specialists in any line could be obtained. It would also be his duty to keep in touch with the different localities and decide where the different tests might best be made. It was specially stated that it was a research laboratory and not a routine laboratory which was in view. I am glad to hear Mr. Barr's remarks on this subject, because while it is possible we are not prepared to go into the matter at the present time, yet it will undoubtedly be taken up in the future; and I would therefore call the attention of the Association to the resolution, just before the close of the report, which might be passed.

On motion of Mr. Delano the resolution was passed.

At the opening of the second day's session Captain Evans, U. S. N., addressed the meeting, extracts of his speech being given in another part of this issue.

The Best Methods of Preventing Trouble in Boilers from Water Impurities.

Mr. H. J. Small (Southern Pacific).—I wish to relate an experience we have had with the method of treating water by placing soda-ash in tenders, as was practiced on the Chicago, Milwaukee & St. Paul. We failed to get the same success that they evidently did on that road, probably due to the fact that the character of the water differs greatly in short distances. At one station there would probably be a large amount of alkali, but at the next station there would probably be a preponderance of the very material we were putting into the tenders, soda-ash. It resulted in an excessive blowing off of the boilers and foaming, causing considerable delay in the service, so that we stopped its use. We found that the pumping station method was the best and cheapest. We have established four such stations and I do not think any of them cost over $1,500.

Mr. F. A. Delano (Chicago, Burlington & Quincy).—I wish to refer to a method in use in Europe, and I think to some extent in this country, of treating the feed water by waste steam to raise the temperature, and by raising the temperature precipitate a good many of the impurities. One reason that the lime salts are held in solution in feed water is the existence of the carbonic oxide in the water, which is got rid of as soon as the temperature of the water is raised close to the boiling point. The Committee speaks of a method of distilling the water; but it is cheaper to heat the water nearly to the boiling point than to distill it. At a great many points there is steam going to waste, which, if turned into the reservoirs, would be effective in throwing down these lime salts which are giving so much trouble.

Mr. J. N. Barr (Chicago, Milwaukee & St. Paul).—All these methods are good, and it will require considerable discussion to calibrate them in order to prove which is the best; but there are none of them good if they are not followed out properly. At first we had to suspend boiler washers because they did not carry out instructions, and we are far from doing the work properly yet.

Prof. H. Wade Hibbard (Cornell University).—In reference to heating feed water by exhaust steam it should be borne in mind that exhaust steam contains oil, and if you heat your feed water by exhaust steam it should be heated by the exhaust steam passing through coils of pipe, so as to prevent the oil in the exhaust steam getting into the feed water; or else if you do run your exhaust steam directly into the feed water you should extract that oil from the feed water perhaps by running the oily feed water through a chamber containing hay or bagging, or some material of that sort. It is well known that oily feed water will produce a deposit in the boiler which is far more dangerous than a deposit of lime or magnesia.

Mr. J. Mackenzie (New York, Chicago & St. Louis)—What we find gives us most relief is a proper use of the blow-off cocks, and in connection with the blow-off cocks, the perforated pipes in the boiler. We use in connection with the perforated pipe what is known as the ruby oil treatment. We feed the oil into the cylinders. I understand that on the Erie road they have increased the mileage of their engines twenty-three per cent. If they had not introduced this treatment on their line during the last year they would have had to buy 150 or 200 engines to do the business. We are running two passenger engines equipped in this way, five thousand miles between washings, and when they are washed the plugs are taken from the front of the sheet and back of the sheet, and the bottom of the boiler rinsed out. We do not find any sludge around the pipe. Our rule is that the moment the engine is put on the ash pit the surface blowers are opened for a minute and a half. We let the water settle towards the lower blow-off cock, and then blow that off, first the bottom of the boiler and then the leg of the boiler.

Mr. W. S. Morris (Chesapeake & Ohio).—Ours is one of the roads which is not troubled with bad water; in fact we have some water on our line which is too good. We were obliged to abandon one tank, which only had about 3½ grains of solids to the gallon, simply because it acted on the boiler plates. At some points of our line we have the Ohio River water, where the solids are mechanically mixed, and I think the system of blowing off is a good one for that territory.

Mr. Wm. McIntosh (Central Railroad of New Jersey).—Referring to the recommendations of the Committee, as to the engine on the New York, Chicago & St. Louis, and also Mr. MacKenzie's remarks about the value of the perforated pipe, I would say that so far as my experience goes, the benefit is derived from the number of blow-off cocks and their location. The natural circulation of water will carry impurities to the blow-off cocks. I am of the opinion that the surface blow-off cock at the ash pit is of no benefit, because whatever has been on the surface has settled before that time arrives. The surface blow-off cock should be used when the engine is working, the harder the better. Then whatever precipitate there is is being carried with the circulation of water upwards and forwards to the front part of the boiler, where a connection to the blow-off cock in the shape of a scoop would gather it all and carry it off. Referring to Mr. Small's difficulty as to the loss of fuel when blowing off his engines I am of the opinion that he had not used the system long enough to determine its value; in other words, when blow-off cocks are first introduced the men are apt to use them without judgment, blowing off indiscriminately, and, of course, in doing so they waste fuel. The best effects are derived from opening them but short periods and frequently, and opening the surface cock when the engine is working hard; and in this connection it is advisable to train the men carefully to use the cocks properly.

Mr. J. Mackenzie.—We run the engines with the pipes and we run engines without the pipes. Those with the pipes will take care of it the whole length of the boiler, and those without the pipes will take care of about a foot in the neighborhood of the cock. We run engines five thousand miles, and there is not sludge enough in them to stain a piece of white paper after the engine has been in.

Relative Merits of Cast-Iron and Steel Tired Wheels for Locomotives and Passenger Car Equipment.

Prof. H. Wade Hibbard.—On some roads in passenger service the four-wheel engine truck has the leading axle with steel-tired wheels, and the other axle with cast-iron wheels. I would ask the Committee if it considers that is safe enough?

Mr. J. N. Barr.—The only wheel that in my experience is liable to break the flange off, when the flange is in good conduction and everything perfect, is the leading pair of wheels on engine trucks. I would say that if the leading pair of wheels be steel-tired to meet the requirements that call for a stronger flange than you get on cast-iron wheels, it is sufficient. I have never seen a good flange of a cast-iron wheel give way in any place except in engine truck service. That is the particular point of safety. So far as other points are concerned, I believe the cast-iron wheel will retail its integrity fully as well and possibly better than the steel-tired wheel.

Mr. H. J. Small.—Did the Committee consider the effect on cast-iron wheels of the heavy passenger cars from long continued braking, possibly increased braking power necessary to hold these cars?

Mr. J. N. Barr.—That is a very important question, and I had some experience in that direction while I was on the Pennsylvania RR. On the Pennsylvania I believe we never had a broken cast-iron wheel running on those grades on passenger cars. We had them on freight trains. On the Chicago, Milwaukee & St. Paul road we have never had a broken passenger car wheel that would derail a car arising from anything of that kind.

Mr. F. A. Delano.—One thing which I think confuses the entire subject in our minds is the fact that in both the steel-tired wheel and the chilled wheel there has been a vast improvement made in the last three or four years. The steel-tired wheels that were made up till five years ago have given in service a great deal of trouble from breakages through the retaining ring cavity groove and through the piping. The improved method of fastening the tires and the improved methods of casting the tire ingots have done away with this difficulty. In the same way the chilled wheel has been greatly improved in the matter of material. The thermal test has tended to that, and lately the question of the design of cast-iron wheels has been taken up. The greater weight of the plate of the wheel has greatly added to its strength and its life.

The President.—The Committee is continued and instructed to consider the different weights of wheels for the different tenders, including the distribution of the metal in the hub, plate and tread as well.

Mr. J. H. McConnell.—I move that two additional members be appointed on Mr. Barr's Committee and they be selected from those having heavy grades. Carried.

Topical Discussions.

Can the ordinary marine salinometer be used to advantage in districts where alkali water has to be used, in order to avoid excessive concentration and damage to firebox?

W. S. Morris (Chesapeake & Ohio).—The salinometer consists simply of a brass cylinder with a valve for regulating the flow of water into the cylinder, and a device where the flow is made extremely quiet. When there is drawn from the boiler a sample of water of sufficient quantity to fill the pot the valve is closed and the hydrometer is then introduced into the cylinder. This hydrometer, of course, does nothing but indicate the specific gravity of the sample water, and by that, the specific gravity of the water in the boiler. This instrument, however delicate, could not show the proportions of the several solutions, nor would it indicate the presence of any other solution, either single or combined, of same, or approximately same specific gravity of the water itself. The most injurious solutions are often of a low specific gravity, and the quantity is also proportionately small.

Mr. R. Atkinson (Canadian Pacific).—The possibility of a salinometer was brought to my attention by having a piece of firebox plate sent in which was cracked and apparently burned, with no indication of scale having formed, and as we know that when the steam is distilled from the water in the boiler the salts remain behind, they must concentrate. Suppose a locomotive boiler holds 1,000 gallons of water. In the course of one division, running 120 miles, it is refilled about six times, and therefore the contents of 7,000 gallons are concentrated into 1,000 gallons and doubled on the returning trip; so that if the water contains 20 grains per gallon of impurities we have 13 times that amount at the end of the return trip. If this is soluble impurity the water necessarily is much more dense than it was previously and its boiling point raised, and possibly the firebox sheets may be injured by the increased heat necessary to evaporate water from that solution.

Mr. Wm. McIntosh.—An instrument of this kind might be used to advantage to test the various waters, applying it to a locomotive and running it over the division, under proper supervision, to ascertain the density of the various waters, and then giving your instructions as to blowing off that water to avoid it becoming too dense. I cannot see that it can be applied in any other manner to prevent the formation of scale.

Mr. Angus Sinclair.—The practice at sea is to test the water during each watch, taking the specific gravity, and if it is high, blowing off a certain quantity of water to reduce the gravity. It is not used to any extent to detect the quantity of lime salts or the ordinary salts in land feed water, for the reason that these salts increase the specific gravity of the water very little. You would need an instrument as delicate as a hydrometer to do that.

Is the use of fusible or soft plugs in the crown sheets of engines advisable?

Mr. Wm. McIntosh (Central Railroad of New Jersey)—During a somewhat extended residence in the Northwest in what is known as a bad water country, I can only recall less than half a dozen injured crown sheets resulting from low water. Coming east into a good water region, I expected to find such cases unknown, but, on the contrary, they are quite common. In the West, fusible plugs are not used, while here it is the universal practice. It would naturally seem that the fusible plug should prove a protection by giving timely warning of low water or by extinguishing the fire altogether, but it appears to do neither, for, owing to its dilatory performance, the damage to crown sheet is accomplished before it blows out, or else its action is but partial and the volume of escaping steam not sufficient to affect the fire or attract attention. I therefore conclude that the fusible plug is not advisable inasmuch as it fails to afford the desired protection, and that it is mischievous because it might induce an engineman to take chances which he would not dare assume without it. There is no better protection for crown sheets than properly located water glass and gage cocks, with an efficient engineman in charge who fully understands that he will be held responsible for all damage.

Mr. H. A. Gillis (Richmond Locomotive Works).—I think some members have tried the method of fastening the flue sheets by using a riveted stay alternately with a headed stay .The rivetted stay will give way before the headed stay, acting exactly as a fusible plug, and be more effective. Many stays have been applied in this way, and it would be interesting to know how many crown sheets have broken down under this system, and whether it is or is not a benefit.

Mr. Angus Sinclair.—In my recollection this subject has been up twice, probably oftener. The con-

clusion reached was that fusible plugs did not increase the safety of the boiler; and therefore I move that it is the sense of the Association that the use of fusible plugs in the crown sheets of locomotive fireboxes is not conducive to promoting the overheating of the crown sheets. Carried.

What advantages are gained by the use of piston rods extended through the front cylinder head? When extended piston rods are not used, which type of piston head is the cheapest, cylinder wear considered —the solid head, or one with bull ring and follower?

Mr. R. H. Soule (Baldwin Locomotive Works).—This question of the benefits, if any, following the introduction of extended piston rods or tail rods, is one of those questions which is now coming to the front as one of the natural sequences of the great increase in the size of our locomotives. There is little fixed opinion on the subject, among the railroad men, and no unanimity of opinion among the locomotive builders. I know of one road, the New York Central, which makes it a rule that all cylinders, 19 in. and upwards in diameter, shall have the piston rods carried through the front ends. I heard from a locomotive builder who does not consider it necessary to supply the piston rod extension unless the cylinder is 28 in. in diameter or upwards; there is a wide difference of opinion on this subject. As regards the mechanism by which the piston rod extension shall be supported in cases where it passes through the front end, there is no settled practice. It seems to be difficult to get a bushing or support more than 5 in. in length if you insist on having the piston rod extension in the bushing at all times. If you are willing to have the piston rod extension draw nearly out of the bushing on the back stroke, yau can increase the bushing to 9 in. When these extensions were first introduced into service they did not carry a good service record, because in the early cases they were not lubricated. The question of lubrication comes up, and one locomotive builder states it to be its practice where the extension is applied to always apply a triple sight-feed lubricator. One sight-feed lubricator being devoted to the usual purposes and the two branches of the third going to the bushing or front end cylinders for the lubrication of the piston rod extension. Another locomotive builder states this to be unnecessary, and that the successful lubrication of this piston rod extension only requires some nice work in the arrangement of lubricating grooves in the bushing, so that the steam which is supposed to be supplied with its own lubricant can reach the bearings in question. Among the locomotive builders it is felt that the piston rod extension in some approved form, when the practice has reached a final stage, where it commends itself to the railroads, will be a necessary feature in all future powerful locomotives; but there are a number of details to be worked out, and I do not think it can be said yet that any device which has been put out is an absolute success.

Mr. C. H. Quereau (Denver & Rio Grande).—The road with which I am connected has a number of locomotives with the extended piston rods; but it is true that our engines are drifting half the time. We now have in service a design in which the bearing is 8½ in., and adjusted perpendicularly, so that as the piston rod wears, we can raise the piston to the center of the cylinder. I think that the best device along this line is in use on the Atchison, Topeka & Santa Fe road, in which they have a long bearing similar to the one I have just mentioned, and just ahead of that they have a packing gland. One difficulty with ours, which is simply a brass bearing, and a sleeve over the extension piston rod, is in the matter of lubrication. We have on most of the engines a lubricating cup, a cup in which the oil is placed the same as on the lubricator itself, except that there is no sight feed. It will hold possibly a quarter of a pint; and we find the first time the locomotive throttle is closed the oil is drained out of this lubricator cup. With the device used by the Santa Fe road they have a perfect means of lubrication as much as you have on the piston rods at the back ends of the piston.

Mr. Frank Slater (Chicago & Northwestern).—I find that the cylinder does not wear on the bottom. Nine-tenths of the wear is on the top, and why should we apply something to hold it up when there is no wear?

Mr. F. F. Gaines (Lehigh Valley).—I do not see any necessity for it. We have engines on our road running for five or six years, with 30-in. cylinders, which have never had any support. We have not had any excess of wear in those cylinders over any other.

Mr. R. H. Soule.—One of the legitimate questions in connection with this problem of extended piston rods is whether the increased clearance which necessarily follows its use is not detrimental to the economy of the engine. We will take it for granted that extension piston rods are operated in closed tubes or pockets attached to the cylinder head, although it is entirely possible to make an arrangement by which the extension rod shall pass through a stuffing box; but under the present conditions the usual practice is to use the pockets for the rod to work in, and that necessarily increases the clearance at the front end of the cylinder. I have no information on that point, but it is a legitimate question whether that increased clearance would not impair the efficiency of the locomotive.

Mr. T. R. Browne (Pennsylvania RR.).—I do not think it necessary to have the extended rod on an ordinary sized cylinder. We had an engine with 24-in. cylinders, solid heads, with a lining of block tin around the head. After a while they wore away and the crosshead began to show trouble. The crosshead also had block tin on top and bottom of the wearing surfaces, between the guides and the front end of the crosshead, and it would wear on the bottom of the back and on the top of the front end; and whenever you went by the engine after she was running a little while, it looked as if the guides were out of line. The piston wore at the bottom and the crosshead went down with it. We took the crosshead out occasionally and relined it and put it in again in good condition, and we turned the piston around to let it wear on the other side, but the same trouble would take place. Finally, we decided to put an extension rod on, and after we did so there was no further trouble. We demonstrated on the 24-in. piston that the extended rod was a benefit.

Mr. A. L. Humphrey (Colorado Midland).—So far as the question of extended piston rods on engines that drift a great deal is concerned, I think that is beyond experiment. As it applies to our road I know that with large engines with 20 and 21-in. cylinders, where they drift at times 100 miles at a stretch, it is necessary to have the extended rods in order to keep the cylinders from wearing. I am inclined to think that the stuffing box principle is a good one. We are not troubled with the question of lubrication. Our engines have 180 lbs. pressure and we simply use the lubrication from the cylinder, nothing else, and we have experienced no trouble, except, of course, to turn the bushings often enough to keep them as nearly central as possible. We turn the bushings every 60 days.

Mr. R. Quayle.—With reference to the wear of the cylinders on the top, that used to be a considerable trouble to me, and it may be yet, but I have attributed it to the fact that the oil being of greater specific gravity than steam it naturally falls to the bottom and you have a constant lubrication there which you do not have on the top.

Mr. J. E. Sague (Schenectady Locomotive Works).—Our first effort was with a brass bushing 5 in. in length. That did not seem to be enough, and the wear of the bushing was excessive. We now extend the length of the bushing to 9 or 10 in. We put an auxiliary sight feed in the cup where the extended piston rod is used. We do not feel by any means that it is an absolute necessity, from the fact that we build more engines with extended piston rods in which the auxiliary indicator is not used than in which it is used. It may be of advantage where the engines do a great deal of drifting. We apply the extended piston rods to all compound locomotives, and I am now applying the auxiliary indicators to such engines as do a great deal of drifting. Our experience has been most satisfactory with extended piston rods.

Mr. F. A. Delano.—If what is desired is to increase the bearing surface, it seems to me we can do it in the piston itself rather than to put on a piston rod extension. The Pennsylvania RR., in the case of some new engines, put a flange on the lower portion of the piston, forward and back, and extended it not quite half way around, 120 degrees probably, to carry the piston.

Mr. J. N. Barr presented the following resolutions:

Whereas, Mr. John W. Cloud is about to retire from the position of Secretary of the American Railway Master Mechanics' Association on account of taking up a new business connection which will require him to reside abroad; therefore be it

Resolved, That the great value of the services he has rendered as Secretary of this Association are acknowledged by common consent, and that we appreciate not only the skill, fidelity and zeal which he has displayed in the discharge of his duties, but also his uniform courtesy towards those with whom he has had to deal.

Resolved, That the good will and best wishes of the Association and its members will follow him throughout his future career.

The resolutions were adopted by a rising vote.

Advantages of the Ton-Mile Basis for Motive Power Statistics.

Mr. C. H. Quereau.—I offer the following resolution:

Resolved, That it is the sense of this Association that the ton-mile basis for motive statistics is the most practicable and encourages economical methods of operating; and that it is desirable that the heads of motive power departments urge its adoption on their managements. Carried.

Mr. S. Higgins.—I think the proper loading of cars has an important bearing on the cost of ton-miles. Recently, on the road I am connected with, that matter has been taken up. At one point they were sending out 33 cars a day, and they boiled it down so that the same amount of freight can be taken out in 5 cars. It would be well for the Committee to consider the classification of operating expenses by the Interstate Commerce Commission. I think, too, a more accurate method might be adopted for figuring out the number of locomotives in service. For instance, if a locomotive is in service one day during the month, that locomotive amounts to one-thirtieth of an engine. In that way we would get more accurate results than by following the rule in paragraph 21.

Mr. F. A. Delano.—I ask the Committee to take up one phase of the subject, and that is, in computing the tonnage of the train, shall the weight of the engine be included with the train? The practice on two or three roads that have adopted this tonnage basis is to include the engine. I think there are good arguments both ways, and I would like the Committee to go into that subject.

Mr. C. H. Quereau.—They should also include the speed or time element in this matter. That will be partly compensated for if the suggestion made in the report is adopted that different classes of service be tabulated together.

Mr. Wm. McIntosh.—I had some difficulty at one time to determine why the profits of one division under my charge exceeded that of another; and I could only reach a conclusion by reducing the grade on each division to an average and comparing them. By doing so I found what I thought was the cause of the difference. I fancy that matter will have to be taken under consideration in coming to any uniform basis.

Best Method of Applying Stay Bolts to Locomotive Boilers, Including Making the Bolts and Preparing the Stay-Bolt Holes.

Mr. S. Higgins—We had a machine rigged up for the vibrating test, where we had the conditions the same as in the boiler with the exception of hot water and steam, and we found that where the detector hole was drilled instead of punched, the vibrations required to break the bolt were much greater, and there was no way of accounting for it, except probably some little upsetting of the iron at the bottom of the hole when the punching was done.

Mr. R. H. Soule—The Committee has recommended that the detector holes should be drilled rather than punched. My opinion is that it is annoying to open the detector holes after the stay bolts have been riveted in place. We infer from that, that their recommendation is that the detector holes should be drilled after the stay bolts have been riveted in position. There is an alternative, to drill the detector holes in the shop before the stay bolts are put in position. The Baldwin Locomotive Works in considering the question of doing the work cheaply, decided to punch these holes. They did so with a bolt heading machine and continued to use it for something over a year, when they fitted up a shop devoted especially to making bolts, stay bolts included, in which they provided special drills, and since that time they have been drilling the detector holes in the stay bolts. It seems to be as good practice to drill these holes before the bolts are in position, as to drill them after the bolts are in position.

Mr. F. Slater—Drilling stay bolts after they are screwed in is not satisfactory, for the reason that the holes are rarely ever in the center of the bolt. Stay bolts, as a usual thing, except on the flat surface, are not perfectly square with the sheet, and a man drilling is apt to run to one side.

Mr. J. H. McConnell—It is our practice to drill the holes in the stay bolts before they are secured in the fire box. We have a machine purposely for drilling the bolts, which is operated by compressed air, and we can drill one hundred stay bolts an hour We put no heads on our stay bolts. They are cut off before the bolt is taken to the machine. We screw them in from the inside of the fire box and that gives us the exact length of the bolt on the outside, and we cut them off with a pneumatic nipper on the inside of the fire box. We do not find any objection in closing up the holes on the outside, because by the use of a small punch the safety hole is opened up.

Mr. R. H. Soule—I think the threads on the stay bolt could be cut by dies just as true to pitch without a lead screw, as with a lead screw. That contradicts the general impression of most Master Mechanics. The impression is that if you do not have a lead screw, you have no guarantee whatever that the pitch will be true on a long stay bolt.

Mr. H. A. Gillis—I have seen a large number of stay bolts cut, 15 and 20 in. long, where no lead screw was used, and they were as perfect threads as I ever saw cut on a lead screw. We are getting these results in our own shops to-day.

Mr. T. R. Brown—We do not use a lead screw in connection with our stay bolt threading machines. We get results in threading a 12 or 16 in. bolt where there will be hardly more than 0.007 in. of variation.

Mr. R. Atkinson—I put myself on record as not being in favor of drilling or punching stay bolts. It appears to me wrong in principle—that the point where the stay bolts fail most is near the outside sheet. It is misleading to have anyone think they could rely on getting a certain result from them, when they would fill up with scale and leave us in the dark as to the condition of the box.

Mr. F. F. Gaines—Our experience has been the contrary—that the drilling of the hole in the stay bolt prolongs the life of the bolt as found in the testing machine. It relieves stresses concentrated at the base of the bolt.

Is it Desirable to Have Flanged Tires on All the Drivers of Mogul, Ten-Wheel and Consolidation Engines? If so, with what Clearances Should They be Set?

Mr. G. R. Henderson—Several years ago on the

Norfolk & Western road, there were some ten-wheel passenger engines running with bald tires in front, and two or three arrangements of trucks for swinging or stationary centers. We found that rigid trucks seemed to meet with a good deal of a blow when the engines struck a curve. We then changed to swinging centers, and they went around the curves nicely, but there was a good deal of side motion. We found the engines would curve more readily and yet the swaying motion would be almost absent, so that a truck with a spring to hold a swing or free center hanger, to return it very quickly, seemed to be the best arrangement. These arrangements were made with engines having bald tires in front, but later there was some change and flanged tires put in front. The truck is furthest ahead and has the longest lever, and it would seem to be the best place to do the guiding.

Mr. J. H. McConnell—I find it is a common practice on the following roads to use flanged tires on ten-wheelers, consolidation and six-wheeler switching engines. A few of the roads at the bottom of the list have lately gone into that, but with the others the practice is common. The roads are: Rome, Watertown & Ogdensburgh, Lehigh Valley, Southern Pacific, Oregon Railway & Navigation Co., Chicago & Western Indiana, Union Pacific, Kansas City, St. Joseph & Council Bluffs, and the St. Joseph & Grand Island. On the Union Pacific road for the past three years it has been the practice with us to apply nothing but flanged tires on our consolidation, ten-wheelers and switching engine. The consolidation engines are running on grades of 90 ft. to the mile with a maximum curve of 10 degrees. Our switching engines in the yard are working over 22 degree curves. It is our practice on the consolidation engines to set the two middle tires a total of $\frac{3}{16}$ in. closer than we do the front and the back tires. We follow the same practice on the ten-wheelers and on the six-wheel switching engines. Our experience has been that we have less wear on the front and back tires than we did when the two middle wheels on the consolidation and the middle wheel on the ten-wheeler was bald. The Burlington & Missouri road purchased some consolidation engines last year for service on the Black Hills line. I believe they have grades of 3 per cent. and curves of over 16 degrees. They found that the flanged tire on these engines was a little unsatisfactory and they were obliged to change them, but on the other portions of the road they give very satisfactory service. The advantage aside from the wear on the tire is, as stated in the report of the Committee, that it requires you to carry only one class of tire, and that is a flanged tire. On all our engines as they come to the shop, where they have a blind tire, we turn them up so as to apply a flanged tire.

Mr. H. A. Gillis—The Richmond Locomotive Works is now putting flanged tires on all drivers of locomotives. We think it makes no difference what the wheel base of the engine is if the allowance between the back drivers and middle drivers be the same on all engines.

Mr. S. Higgins—The Committee rather fixed a limit as to the wheel base of the consolidation engine, only on the basis that it would not exceed 17 ft, rigid wheel base. The Committee is not ready to report yet as to the amount of clearance. That is a matter we think should be gone into next year.

Mr. R. P. C. Sanderson—Assuming that the conditions under which the engines have to be run are such that neither the flanged tires or bald tires can be used, the flanged wheel on the outside of the curve is pressed against the box, and the bald wheel on the inside of the curve is pressed against the box. Now, under these conditions it throws the rods out of line if all the slack is in the box. I think therefore that a system of allowing freedom to the engine by putting the slack into the box is not to be preferred as against a freedom allowing clearance between the flanges of the wheels so that the wheels will stay in line.

Mr. G. W. West (New York, Ontorio & Western)—Our road has used flanged tires for eight years on all classes of engines, moguls, consolidation and ten-wheelers. I want to be put on record as saying that the wisest arrangement of truck and engine is one with the front and back tires flanged.

Mr. A. E. Manchester—We have had experience with the Atlantic type engine. So far as the flange of the wheel is concerned, it is practically a ten-wheeler. One lot of engines were put in service with the flanged tire on all wheels, set evenly on all the wheels. It was necessary to give the driving box $\frac{5}{16}$ in. motion on the main driver and $\frac{5}{8}$ in. on the trailer wheel. The engines never rode satisfactorily, and always struck the curves hard until they were given this motion. Our experience with these engines has been such that to-day we are putting Atlantic type engines in service with bald main drivers.

Mr. C. H. Quereau—I move that this subject be continued and the Committee report next year. I would suggest that they interest the traffic department in the subject; it is possible that we are going to get in trouble in crossing switches, by narrowing the gage between the flanges on the drivers. Carried.

The Use of Nickel Steel in Locomotive Construction.

Its Advantages and Proper Proportion of Nickel.

Is it advisable or not, under any circumstances, to use bars in exhaust nozzles? What are the advantages and disadvantages?

Mr. Wm. McIntosh—While the use of bars or bridges in exhaust nozzles is not generally advisable, I have known cases where an enterprising engineman has succeeded in getting steam by putting a bar in a poorly proportioned nozzle after other means had failed. Putting a bridge in the nozzle simply spreads the exhaust to partially fill a smoke-stack that otherwise would not be filled. Better results would follow a change in diameter or height of nozzle, and allow the retention of the annular form, which experience has demonstrated is best adapted for all kinds of jets and nozzles.

Mr. C. H. Quereau—In reply to the circular letters of the International Committee on the subject of exhaust pipes on front ends, out of 20 replies received, 19 said that under no circumstances would they put a bridge in the exhaust. The remaining one said he would only use it in case of an emergency.

Mr. J. H. McConnell—I move that it is the sense of this Association that it is not advisable to use bars in the exhaust nozzles. Carried.

Is there sufficient prospective economy to be derived from heating the feed water for locomotives, and how can it be most reliably fed to boilers?

Mr. Wm. Garstang—The question deals with a subject, it seems to me, in which our possibilities are limited to practically what we are now doing. We realize the benefits of high temperature feed water, when the high temperature can be obtained without the expense of burning any fuel to obtain it, but at that point economy ceases, as our boilers are better arranged to utilize the heat value of the coal burned than any arrangement we are likely to make possible for heating feed water before it enters the boiler. In conclusion, it seems there are only two practical ways of getting and beneficial results; one by utilizing the air pump exhaust through a coil in the tank, and the other by utilizing any over-pressure in the boiler by turning it into the tank through the injector heater.

Mr. T. R. Brown—Inasmuch as the injectors are being largely used now, I think it settles the matter of heating the feed water. You cannot possibly get the water very warm without interfering with the injector. I think the feed water heater is a thing of the past.

Mr. C. H. Quereau—Of these twenty replies to which I referred, 19 said that they had done nothing on this subject. One said they were now building boilers by which they wished to save some heat from their exhaust. The Chicago, Burlington & Quincy has a couple of switching engines in Chicago, with an independent pump on the boiler head of the left side, and the injector on the right side, the pump to be used to deliver water when the injector is so hot that it can not handle it. We have made tests on our roads with injectors with closed overflows, delivering the water to the boiler at a temperature of about 126 degrees, but their range of action is limited and the amount of water which they supply is considerably less, as it enters warmer. It occurs to me that possibly the arrangement used by the Burlington experimentally now, in having an independent pump on the boiler head at one side of the engine, is productive of some economy.

Standard Pipe Fittings.

Mr. J. N. Barr—I move that this Committee be requested to furnish the names of the manufacturers of pipe fittings and pipe tools, who do adhere, and also those who do not adhere, to the Briggs standard. Carried.

Mr. C. H. Quereau—I have the assurance of the Westinghouse Air Brake Company that although it is using pipes threaded by a standard not in accordance with that adopted by this Association, it will put nothing in the way of the successful use of the Briggs standard. Further than that, it will help us by notifying the Secretary of this Association when railroads are specifying other standards than that adopted by us. I move that the Secretary, on behalf of the Association, send to the heads of motive power departments a circular letter containing a summary of this report, requesting them to use their best efforts to have the specification for wrought iron pipes, including the table of dimensions, and in line with the action of this Association, adopted as standard. Carried.

Topical Discussions.

What can be done to thoroughly relieve the vacuum in a low-pressure cylinder of compound locomotive when drifting?

Mr. Angus Sinclair.—Ever since the cylinders got up to about 20 in. in diameter there has been more or less trouble with the vacuum in the cylinder when drifting, and the trouble from the action of the vacuum on the fire. The usual method of overcoming that has been through the relief valves. When these valves have been thoroughly tried, they have been found wanting. A great objection to them is that they are nearly always leaking when the engine is working steam. Some of us tried the use of by-pass valves. That is not anything new. One of our oldest members used by-pass valves on engines made thirty years ago and found them satisfactory. There was not such a great necessity for them at that time, as now, and as far as I can judge the by-pass valve is bound to be used in the future in all large engines. I think it is the most satisfactory solution of the difficulty.

Mr. C. J. Mellin (Richmond Locomotive Works)—When we adopted the compounds we anticipated that we would have some trouble from the pumping action of the low-pressure cylinder. As we did not discover it in the first tests we made, we postponed for some time the application of any device that would do away with the defect, but shortly after we came on different roads we got into trouble. We then applied the by-pass valve. It shows considerable improvement, and we can increase this valve to any size desired without increasing the clearance of the cylinder to any considerable extent. We had a special test made in that respect, on high speeds, down grade; and we found that with and without this valve there is a difference of about 60 or 70 per cent. reduction in the back pressure of the piston as well as a reduction on the vacuum side.

Mr. R. P. C. Sanderson—In my opinion the best by-pass valve is a throttle valve. Have your throttle open and you will not get any vacuum, and you will save the lubrication of the cylinders and valves at the same time.

Mr. W. S. Morris—I think by the use of the by-pass valve is about the only way you can accomplish it. I can hardly agree with Mr. Sanderson that the open throttle is the only thing which will overcome the vacuum in the low-pressure cylinder. We find that we get greater economy from our compound engines by using the by-pass on mountainous districts. We get at least 20 to 22 per cent. economy in fuel, without any additional cost for repairs on the level districts, and in the mountain districts where these by-pass valves were not applied to the machine, the percentage of economy rarely ran over 11 per cent. By applying them it increased, and the saving compared with the simple engines was about 15 per cent.; but not as great as on level districts.

The election of officers resulted as follows:
President, J. H. McConnell.
First Vice-President, W. S. Morris.
Second Vice-President, A. M. Waitt.
Third Vice-President, J. N. Barr.
Treasurer, G. W. West.
Secretary, J. W. Taylor.

The Crescent Shipyard.

Mr. Lewis Nixon, at the Crescent Shipyard, has now on the stocks and booked 14 vessels, and his contracts in hand will aggregate $2,000,000. Taking the craft in order, as they lie along the water front, we find first a steel barge for the New York Automatic Coal Barge & Weighing Co. This is a part of a scheme for coaling at sea and weighing the coal delivered as it passes from the barge to the ship. Obviously, it is a method which would be of great value to warships, but of course its principal application will be around harbors.

Next to this lies a yacht for Mr. Lawson, whose name has lately been made famous by the Lawson pink. This craft is 165 ft. long, 22½ ft. beam and 9 ft. deep.

Next lie two torpedo boats Nicholson and O'Brien building for the U. S. Navy. These are to be powerful craft of their class, with twin screws, the screws to work under the overhanging hull so as to always be in solid water and get the full value of the thrust. The contract speed guaranteed for these vessels is 26 knots and the builder proposes to engine them well up to this speed, so that he will not be bothered to make more than one trial trip.

Next in order is the monitor Florida, U. S. Navy. This is a one-turret monitor to carry two 12-in. guns and a suitable armament of smaller guns. She is to make 12 knots at the maximum and to carry coal for 6,000 miles.

Next to the monitor lies the yacht Columbia, building for Mr. Ladew, of New York, and now nearly finished. This is a beautiful craft, a close reproduction of the U. S. Coast Survey ship Pathfinder, built

by Mr. Nixon. She will carry coal for 7,000 miles, has triple expansion engines to develop 1,100 h. p. and is guaranteed to make 14 knots. She has also a large sail area and is capable of keeping the sea a long time and with comfort. She will make an excellent auxiliary warship.

Other craft building are a vidette boat for the U. S. Army, 105 ft. long and 32 ft. beam, to make 14 knots; also six torpedo launches for Russia.

All of the boilers for these ships are built at the Crescent yard, as are the engines for the monitor Florida and some other engines. The engines for the torpedo boats and for other craft are contracted out.

Aside from the contracts on hand Mr. Nixon has been lengthening and refitting his own yacht, the Loudon, on which he lives in the summer.

Locating the Cut-Off and Other Events on Locomotive Indicator Cards.

By C. H. Robertson.*

Locating the point of cut-off on an indicator diagram is a matter of considerable importance in the investigation of steam engine performances, and almost equally important is the locating of the points of release and compression. The practice in the steam engineering laboratories of certain technical schools is to put the point of cut-off at the point of inflection between the expansion and admission curves, and in case of doubt the student is directed to vary in the direction of safety; that is, down the curve. This may be seen in Fig. 5, where is shown a locomotive indicator card with the cut-off point at P, the small arrow indicating the direction to move

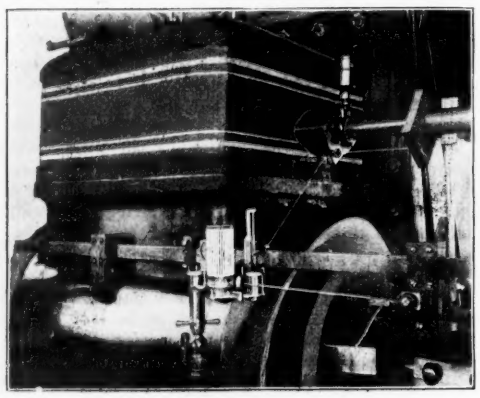


Fig. 1.—Attachment of a Valve Motion Indicator to a Locomotive.

if in doubt. The same considerations are observed in locating the points of release, compression and admission shown in Fig. 5 by the letters Q, R and S, respectively.

That this is not the usual practice in locating these points the writer is well aware, as the method has been criticised on more than one occasion and by men of no little reputation as engineers. The question has been discussed on various occasions and has occasionally been considered in the editorial columns of the technical press. So far as the writer is aware these discussions have been based upon the shape of the curves of the indicator card itself, and the conclusions therefrom have been by no means unanimous. There appeared no reason why an attachment could not be made to an ordinary steam engine indicator that would superimpose a valve motion card (or valve ellipse) upon the conventional indicator card. This diagram, with valve data easily observed, would at once give an accurate means of locating not only the time, but also the extent of valve opening and closing for both the live and exhaust steam.

Such an apparatus is shown in Fig. 1. It consists

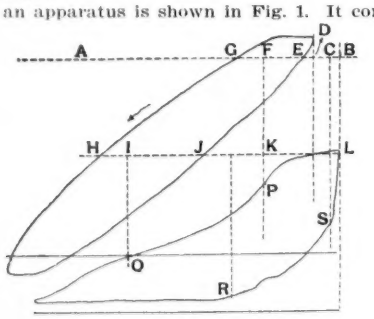


Fig. 2.

of an ordinary indicator to which is attached a pencil motion of another indicator. This attached pencil has a motion quite close and parallel to the indicator pencil proper. Instead of showing the steam pressure, as in the ordinary indicator, it is pulled up by a light spring and down by a fine cord connected to the valve rod of the engine, thus recording the valve motion relative to the piston travel. This permits of taking valve ellipses at any speed and at the same time does not interfere with the taking of indicator cards in the usual manner.

The accuracy of this attached pencil motion may be tested by taking diagrams with the indicator drum string and the valve motion string attached to the same reducing rig. This should produce a straight line at about 45 degrees with the horizontal, and any error in either the drum motion or the pencil motion would result in a deviation from a straight

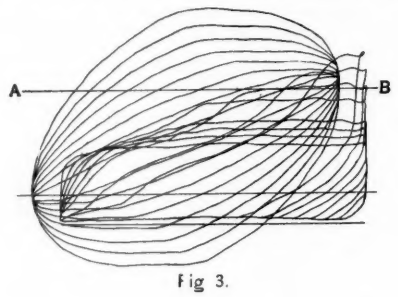


Fig 3.

line of the diagonal. Any lost motion would be evidenced by a loop. In the present instance neither of these faults appeared in any considerable measure and it was therefore assumed that the apparatus was practically correct. At first thought it would seem that such a line would be exactly at 45 degrees with the horizontal. This would be true if the motion of the paper on the drum were the same as the motion of the center of the cord operating it. In wrapping about the drum, however, the center of the cord acts at a distance from the center of the drum greater than the distance of the paper by the half diameter of the cord. The vertical motion of the pencil is, therefore, greater than the horizontal motion of the paper in the proportion of these two radii.

The indicator card and valve ellipse, shown in Fig. 2, were taken from the Purdue locomotive, Schnectady No. 2, when running at a speed of 25 miles an hour, with the reverse lever in the fifth notch forward of the center. Before starting the engine, the valve indicator pencil string was attached to the valve rod. The reverse lever was then shifted until by tram measurement the valve was known to be in cut-off position. With the valve in this position the pencil was pressed against the paper and by rotating the drum the line A-B was drawn. The engine was then started and a card taken. Evidently whenever the valve motion pencil crossed the line A-B the valve was at either cut-off or admission. The cut-off, therefore, is at G and the admission at E. Since the valve ellipse is made on the same drum and at the same time as the indicator card, its horizontal dimensions are the same. It remains but to lay off the distance D-G from the end of the indicator card to determine how far from the beginning of the stroke cut-off actually occurred. This is conveniently done by laying off B-F equal to D-G and dropping a perpendicular F-P from A-B at F. The point P is then seen to be the point where the valve is fully closed and this is the conventional definition of cut-off. By an exactly similar process the point S is determined as the point of admission. To locate the release and compression points it is but necessary to lay off on the line F-P the distance F-K equal to the sum of the steam and exhaust lap of the valve and draw the line H-J parallel to A-B. The point H will be release and point J compression. By the same process as before the points are transferred to the indicator diagram and appear at Q and R respectively.

The flat places at the top and bottom of the ellipse are worthy of comment as they represent lost motion in the valve mechanism of the engine. That there was lost motion in the engine was easily apparent to one placing his hand on the valve rod, especially at slow speeds. In Fig. 3 may be seen a series of cards that represents the valve action of the locomotive throughout a wide range of cut-off. The outside ellipse and the indicator card with the longest cut-off were made with the reverse lever in the corner. Each succeeding inside card represents a change in the reverse lever of four notches, until for the inside ellipse the lever was within two notches of the central position. These cards were made at a speed of 15 miles per hour, or about 73 revolutions per minute. As in the preceding card the cut-off line is marked A-B.

A change of speed in the locomotive has a very decided influence on the shape of the indicator diagram. This is illustrated in Figs. 4, 5 and 6, where are shown three cards taken at 15, 35 and 55 miles per hour respectively. The valve ellipses show the greatest flatening at the slowest speed. The slow-speed cards show also a considerable dip at X after starting the valve from the end position, probably the result of relieving the strain on the valve mechanism due to starting the valve. In the highest speed the mechanism is under a more constant stress and does not have this "stretching" and "recovering" action. Otherwise the ellipses show about the same valve action. The differences in the indicator cards are due to the higher velocity and consequent wire drawing of the steam in the ports.

Had a little more data been observed it would have been an interesting thing to have determined the velocity of the steam in the ports of the engine. The length of the steam ports is of course constant. This would represent one dimension of the hole through which all steam passed on its way to the cylinder. The distance from the line A-B, Fig. 2, to the valve ellipse would have been the other dimension of the port at the point of the stroke where it was measured. Neglecting for a moment condensation in the cylinder the indicator card shows approximately the volume of steam that has passed through the port. This would be exactly true were it not for the expansion due to the changes of pressure, a factor in any event small. This expansion would tend to increase the apparent volume of steam which has passed the ports and in a measure counteract the effect of the condensation. Investigation is now under way to determine the amount of this condensation, when it will be possible to give the actual velocity of the steam. Work already done indicates that this velocity is much higher than is generally supposed.

That the same conclusions about locating the point of cut-off for this locomotive may be applied to other engines is quite certain. In Fig. 7 is shown a card from a Straight Line engine running at 270 revolutions per minute. The lettering for locating points is the same as in the first locomotive card and the same methods were followed in making the diagrams and locating the events. The sloping admission line was due to a partly closed throttle valve and makes it much more difficult to locate the cut-off point by the usual method. That the true point is at the point of inflection is quite evident. In Fig.

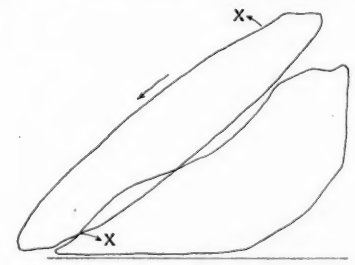


Fig. 4.—Fifth Notch, 15 Miles an Hour.

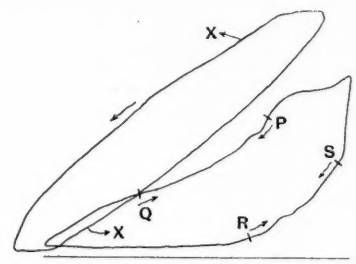


Fig. 5.—Fifth Notch, 35 Miles an Hour.

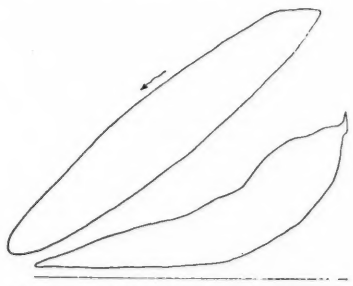


Fig. 6.—Fifth Notch, 55 Miles an Hour.

8 is a card showing the governor action of the same engine which was taken continuously while the load changed from light to heavy. The engine is of the shaft governed type but has a peculiar valve mechanism.

The governor action of a 10 by 16.-in. shaft governed Atlas engine is shown in Fig. 9. This governor is typical of a large class of single valve shaft governed engines. The Corliss card shown in Fig. 10 is radically different from any of the preceding. The valve is cylindrical and is opened and closed by an angular motion about its own axis. To secure the valve motion diagram it was but necessary to wind

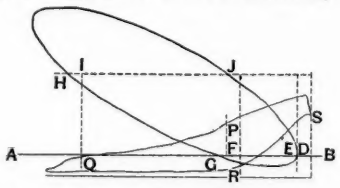


Fig. 7.—Straight Line Engine, 7 x 10 in

the valve motion string on a pulley carried by the valve spindle and of the same diameter as the valve itself. The cut-off line is A-B as before, the cut-off coming at G and the admission at E. These transferred to the indicator card appear at P and S. The

*Instructor in the Engineering Laboratory, Purdue University.

governor action of the engine is shown in Fig. 11, where the cards are seen to have the same general characteristics excepting the outside one, in which case the governor was so far down that the valve mechanism did not unhook, thus permitting the steam to follow the full length of the stroke. The cut-off line is not shown.

In every case illustrated the cut-off seems to fall at the point of inflection between the expansion and admission curves. In view of the number of different

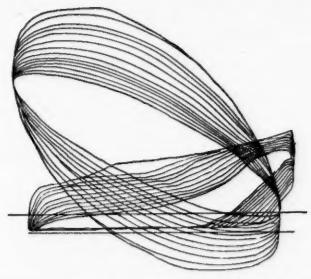


Fig 8.—Governor Action, 7 x 10 in. Straight Line Engine.

engines tested and the close agreement one with another there seems to be little doubt that this is the proper location of the cut-off event.

Captain Evans at the Master Mechanics' Convention.

At the convention of the American Railway Master Mechanics' Association, at Old Point Comfort, Captain Evans delivered an address, a few extracts from which are printed below :

In 1882 I had the good fortune to be ordered as a member of what is known as the first advisory board for rebuilding the navy. It was an awful hot summer, and fifteen of us rather impatient spirits got together in Washington, presided over by Admiral John Rodgers. When we looked the field over we found that we had no navy at all, we were hopelessly behind the age, and it seemed hardly worth while to rebuild our navy. I shall never forget, as long as I live, the trouble I caused in that small convention by proposing that we should build steel ships. I was the original steel man, and when I proposed that all ships in the future should be built of steel, Admiral Rodgers adjourned the board for three weeks to prevent a fight. That, you will remember, was not a great many years ago—1882—this is 1899. At that time we could not make a steel plate in this country; we were buying gun tubes from England; the idea of smokeless powder was beyond anybody's conception. . . . Since that time I have had the pleasure of seeing American ship plates go away beyond anything from abroad; I have seen American guns pronounced the best in the world; I have seen American steel ships do pretty handy work when they were called upon. You are the representatives of the people who did all this. . . .

When the war with Spain was threatened, I was fortunate enough to be in Key West. I was in New Orleans when the Maine was blown up. I was satisfied

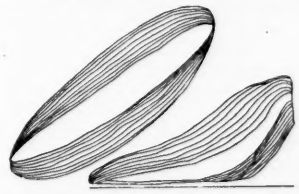


Fig. 9.—Governor Action of 10 x 16 in. Atlas Engine.

with the indications that we saw wherever the people congregated the next morning, that we were going to take it out of the Spaniards sooner or later; that nothing could stop it. The Congress of the United States was perfectly helpless, and the people meant to fight. . . .

We were on a peace footing in the navy. I am afraid that we deceived you about the peace footing business. The difference between the peace footing and the war footing is a little curious to those who do not understand it. On a peace footing we go to quarters at night with the guns ready to fire in three minutes. When we get on a war footing, we do it in two minutes and a half. We were on a peace footing in April of last year. We were lying off Key West, all very peaceable, but we had plenty of ammunition, plenty of coal, and plenty of food, and we had lots of men, good North American chaps behind the guns.

On the night of April 21st we were all assembled aboard Admiral Sampson's flagship off Key West. It was a rough, nasty night. The Admiral was anxious to know what we were to do the next morning. Several of us, after waiting till eleven o'clock, proposed to go back to our ships. Admiral Sampson said, "sit still and smoke another cigar, we must have some news from Washington in a few minutes." After we lighted fresh cigars and sat smoking for a few minutes, an orderly came in and reported that there was a torpedo boat coming very fast. In a few minutes the message from the torpedo boat was received, and it was very short, somewhat like a lemon. It read, "War declared; blockade the coast of Cuba from Bahia Honda to Nuevitas." That was half-past eleven o'clock at night of April 21. At twelve o'clock I went back to my ship, and at that time I could see the searchlights of the small vessels coming out, feeling for the buoys, and at four o'clock that morning, after having been on a peace footing until eleven o'clock of the same night, we started for the coast of Cuba, and at four o'clock of that afternoon we locked Mr. Blanco up in proper shape in Havana.

I believe it was a record breaker in the way of establishing a blockade. I do not think there is anything in history that equals it, and as to the effectiveness of the blockade, you all know about that. We starved a good many people to death, and unfortunately most of them were our friends. From the day that the blockade commenced until the close of the war we had 118 ships in line on that coast, without a light at night, and there never was a single collision in that fleet, which shows you that not only were your ships good, but your officers had been fairly trained for their business. We were in all sorts of close places, frequently at night, with twenty ships so close together that you could hail from one to the other, and at no time could we see from one ship to the other, and we had no lights, but we managed to keep clear of each other. None of our ships were sunk, notwithstanding the opinion entertained in the country and expressed through the newspapers that when we got these dreadful machines agoing, these awful steel ships and all their torpedoes and new machinery, that we would smash each other up instead of the enemy. We did not do anything of the sort—we smashed the enemy when we got the opportunity.

There is one thing I would like to impress on you smart North American business men, who run the country—do not let us get back to the position that we were in in 1882. We had come out of a great war then, after a magnificent record in the navy, but we soon dropped behind everybody else. We simply stopped in our tracks, while other countries went ahead. We have just come out of a small affair in the way of a war, but do not let us stop now. Keep shoving us along and keep us up to our work. Give us plenty of new ships. I do not know that you will require to use them, it is not my business to argue that part of the question; we do what our employers want us to do. If you want us to fight Spain, we will do it. If you want to hold the Philippine Islands (of course in the navy we have nothing to say about that) give us the word and I think we will hold them for you. Keep us to our work, and do not let us drop back.

There is a very large watermelon out in the East

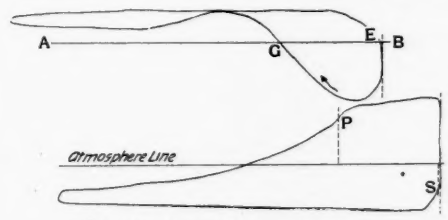


Fig 10.—Corliss Engine, 16 x 24 in.

Indies, and it may be cut. . . . If you prefer to cut the watermelon now and take your slice of it, let us know and we will get it for you.

One thing remember, please, that in the navy we must have a little time for preparation. You cannot make officers and sailors in a week. . . . One word more. In the battle of Santiago, July 3, nearly a year ago, the United States had an enlisted force in its ships that, in my judgment, has never been equalled in the world. We were 97 per cent. Americans, and there were 85 per cent. native born Americans. I say to you without hesitation, that the greatest moment in my life—and I believe the greatest moment in any man's life could not be anything finer—was when the Spanish ships first came in sight, to see the faces get red and the eye begin to snap, of the 600 North American chaps who were on my ship, every man wanting to fight, and every man knowing how to fight, and every man of them did fight hard and well that morning.

I say to you without hesitation that it would not have made a particle of difference if it had been six English battleships—I mean six German battleships—it would not have made any difference whose battleships they were, they would have been whipped just the same. I say that not without reason, because you have only to take the shots that struck the Spanish ships, and if we hit any other ships on earth in the same way we would have whipped them. It is simply the effect of shot and shell. It would not have made any difference as to the nationality, we would have sunk any other ships, beyond any question, if we had hit them the same number of times.

The Civil Engineer in France.

The Society of Civil Engineers of France has completed the reports of the celebration of its semi-centennial, having been founded in 1848. The year was celebrated chiefly by the inauguration of a bust of Eugene Flachat, its first President, six times re-elected, in one of the public places of Paris.

The organization of the Society is of interest. A civil engineer in France is essentially one who is

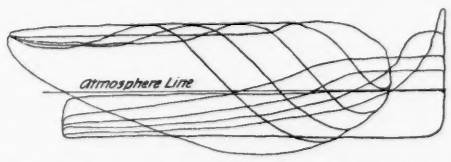


Fig. 11.—Governor Action of 16 x 24 in. Corliss Engine.

not a Government engineer, and one of the latter may not become a member of this Society while an active member of the Corps of "Ponts et Chaussées." The reason given is that the latter have a certain control over all public works, and, to a greater or less extent, of the civil engineers in charge of such works.

The Management is composed of a President, 4 Vice-Presidents, 4 Secretaries and 20 members of the "Committee" divided into four sections, viz.:

1. Public Works and Constructions.
2. Mechanical Engineering.
3. Geology, Mines and Metallurgy.
4. Physics and Industrial Chemistry, to which a fifth, Electricity, has lately been added.

The transactions mark the Semi-Centennial of the Society by a resumé of the work performed by it. They review, 1st, the history of the civil engineer in a country where every thing is done by the state; his struggles for employment, the continual opposition of the government and his success through public opinion.

After the wars of the Empire, commerce and industry revived and capital was invested in them. But there can be no commerce and industry without means of transportation, and at that time the only means of transportation were the common roads, then in a wretched condition. The civil engineers undertook to improve them, but they were in the hands of the engineers of the government, badly maintained and burdened with antiquated regulations which embarrassed instead of promoting communication. The civil engineer claims to have secured their improvement both in methods and materials through the influence of the transportation companies, and some of them were appointed inspectors to see the improvements carried out.

The government of the Restoration was liberal and disposed to grant to private parties the construction and improvement of new canals. The administration opposed it as all such work belonged to its engineers. A company was organized for irrigation and drainage. Irrigation and drainage were then made a function of the government to be executed by its own engineers. Looking about for something that would not be taken up by the government, some of the best of the civil engineers turned to metallurgy. They were subjected to restrictions which would have limited their powers, had not the influence of the mine owners and the iron masters been able to cause their abolition.

Then came the railroad era in Great Britain. The success of Stephenson's engine, the "Rocket," was due to the tubular boiler invented and patented two years before by Marc Seguin, French civil engineer. But in France the railroad did not become popular. Arago and Thiers opposed its development. A few short lines were built by civil engineers by private capital between 1835 and '38. In 1842 the government undertook the construction of the nine main lines and their lease to the great companies. The government owned the land, graded the road-bed, and built the stations, but the track was furnished and laid by the company's engineers, the shops and stations were equipped by them, and they had charge of the operation, always under the surveillance of the engineer of Ponts et Chaussées. It was, however, a school of instruction for the civil engineer and his advance was rapid. The Central School of Arts and Manufactures, established in 1830, had among its professors and graduates men who made great names in the railroad world. Talabot, Jullien and others resigned from the Corps of Ponts et Chaussées to take service under the great companies.

The civil engineer was debarred from public works, the most attractive of all the branches of the science, as it is also most necessary. Industrial and agricultural engineering rest upon it. They were at first consulting engineers only, making plans to be executed by others. They have become builders, owners, and managers of industrial works. Those who wished to follow public works constructions have looked for and found their places in foreign lands, and some of the greatest works have been built by them.

And now the government is about to provide that the civil engineer shall not be permitted to assume the title, but shall have a degree. And the reason for this is peculiar. It is to increase the value of the foreign export, that its quality be not depreciated by charlatans who may in other lands assume the title of French civil engineer.

The record of the works of the Society in its 50 years of life is too long to be more than mentioned. The five sections of the Society's work have been sub-divided into 53 articles each by an expert in the particular branch. Their quality is various as the personality of their authors. Some confine themselves to a mere list of the discussions in the Comptes Renadus of the Society, but most of them give each a pretty complete history of the development of his specialty, with great fairness referring to foreign works, notably English and American. Most of the papers give the history of the specialty from the beginning of the present century, and the progress made since the foundation of the Society in 1848, not only by its members and in France, but by others and in other countries. A few notes from these special chapters may be of interest.

In *tunnels* it was "our colleague" Sommelier, who, in 1857 first applied the idea of "our colleague" Colladon to transmit force to a distance by compressed air. At St. Gothard, in 1874-5, compressed air locomotives removed the excavated material and brought back that for the masonry. Since the accidents at the tunnel of La Braye in 1883 the use of compressed air has been prohibited in tunnels. Within the last few years "official science" has permitted it, and some works have been executed

with shields in very bad ground. In foundations by compressed air, in addition to the usual form, caissons, the side walls of which were of masonry only, have been used; at other places movable caissons which have been raised as the work progressed and finally removed, leaving no iron in the work.

In *harbor works*, concrete blocks, once used by the Romans, were re-invented by Poirel at Algiers. They have been applied on a much larger scale in more recent times, notably at Bilbao, where blocks of 1,500 tons were partly formed in iron boxes, floated into place and the filling completed.

The paper on *bridges* contains some interesting facts. From 1776, the date of the earliest iron bridge, to 1830, the arch of cast iron was the only form in use, if we except two or three small arches of "forged" iron built in France. With the advent of the railroad the straight girder came into favor, made of cast iron, sometimes trussed with wrought iron, up to spans of 60 ft. Above that width the cast iron arch was used. With the construction of the Britannia and Conway tubular bridges of wrought iron plates, that material came into vogue. Brunel at the same time adopted the bowstring. French practice followed that of England. The Germans adopted the multiple lattice, the web of which is composed of flats closely spaced. In 1855 Brunel built the Saltash bridge, 456 ft. span, with long panels. The weight of each span of this bridge was 930 tons, and its cost $800,000. Each span of the Britannia bridge, 472 ft. long, weighed 1,300 tons, and cost $3,000,000. This was the condemnation of the solid web for long spans, and the lattice in all its forms was largely developed. In France the lattice with rigid braces and long panels was adopted. Germany adhered to its multple lattice. The first combination bridges in America, the Howe and Pratt, date from 1838. The compression members being of wood, the iron was reserved for tension. These were practically articulated structures, for facility of erection. In 1847 Squire Whipple, it is noted, built the first iron bridges in America, adopting the forms of those already in use, and in 1848 published a rational method of computing the stresses in the different parts of an American bridge. Almost in the same year General Jouransky, a Russian engineer, published a similar method for the calculation of timber lattice bridges. After 1865 metal bridges were more largely introduced. In America the single and double intersection lattice was frankly adopted under rational conditions.

In foundations: Frieger first applied compressed air in 1839 to sink a tube through water-bearing sand to a mine. The first compressed air foundations for bridges were the wrought iron tubes of the Rochester bridge in 1851, and the Saltash bridge in 1854. The first tubes were of wrought iron, after the bridge of Szegedin (Hungary) in 1857; they have been made of cast iron. The first compressed air cassion was used at Kehl in 1860. The Americans have set the example of large caissons in the Brooklyn bridge, and in the St. Louis bridge, of 17,500 square feet, but "we have exceeded these dimensions in building the dry dock of Mississy (Toulon) of 63,500 square feet." In modern French bridges continuous spans are chiefly used. The 8 spans of the viaduct of Cubzac, 1,930 ft. in total length, were put in place by being pushed (lancé) from one end over the seven piers to the further abutment. Numerous bridges by French engineers, in France, Algeria, Spain and Egypt, indicate their present views as to continuous girders, which have been promoted by the introduction of foundations by compressed air, leading to more solid foundations. The two Egyptian bridges were founded, one 97 ft., one 120 ft. below high water. "The method of foundations by means of compressed air, first applied by the English to bridges, seems later to have been forgotten by them; it was re-imported by a member of our society for the foundation of the deep-water piers of the great Forth Bridge."[1]—Coiseau.

voussoirs of cut stone has given way to the use of smaller material, due to the great progress in the manufacture of cements. Notwithstanding the economy and rapidity with which large metal structures are constructed, large spans in masonry have been built, and a list is given of numerous arches in France approaching or exceeding 200 ft. Two in Italy are named, and finally Cabin John Bridge of 220 ft. span in America.

The seaports of France are reserved to the engineer of Ponts et Chausseer. The part of the civil engineer in them has been only as contractor, in which, however, he has shown his spirit of initiative and resource. His chief laurels have been won in other lands. Of dry docks, in 1867 reference is made to the tendency of the Americans to build them of wood. The want of them in France in earlier times is mentioned. Certain Americans in 1844-46 constructed floating docks 200 ft. long at Marseilles, Bordeaux and Havre; these with certain ship railroads furnished the only facilities to commerce. This has been largely changed since 1860.

[1] "This important work of foundation was executed with great success by M. Coiseau, who through modesty, has not wished to mention his own name. It belongs to us to recall it here."—The Reporter Generals.

In bridges of masonry the type of arch with large

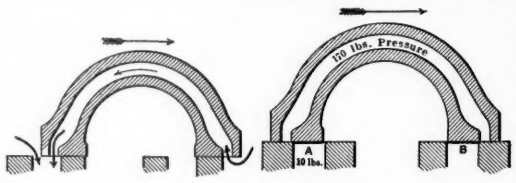
The Allen Valve for Locomotives.*

By Mr. C. H. Quereau.

There are decided differences of opinion among railroad mechanical men as to the value of the Allen, or double-ported, valve, a diagram of which is given in the accompanying illustration. Those who favor its use claim that it secures a greater mean effective pressure than the plain valve by giving a more prompt and full admission, thus increasing the power of locomotives on which it is used. Those who oppose its use claim there is no difficulty in getting all the steam into the cylinders that is needed without the Allen port, the main difficulty being to reduce back pressure and compression; that if the Allen valve gives a freer admission, its use necessarily increases the difficulty of getting the steam out of the cylinders, increasing back pressure and compression and causing the engines to pound badly.

Objections.

Strictly speaking, compression is the period of the stroke from exhaust closure to lead opening. The term "excessive compression" is commonly used to denote a suddenly rising pressure at the end of the return stroke which takes the form of a loop on the indicator card, and is usually wrongly assumed to be caused by the compression of steam remaining in the cylinder at the time of exhaust closure. If exhaust closure takes place at half stroke with three pounds back pressure and eight per cent. cylinder clearance, the pressure in the cylinder at the end of the stroke will reach only 113 lbs. If the back pressure is 12 lbs. and compression begins at 15 in., the full stroke being 24 in., the highest pressure attained at the end of the stroke will be but 137 lbs. With the usual locomotive valve gear and the valve line and line inside, compression begins at about 15 in. of the return stroke. These facts remain true whether the valve is of the common type or an Allen valve. From the foregoing it is quite evident that the Allen valve cannot produce a compression



The Allen or Double-Ported Valve.

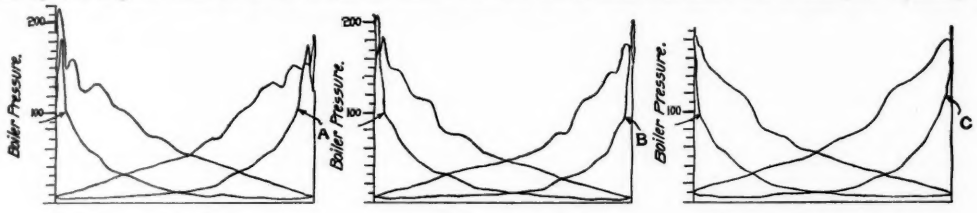
equal to the boiler pressures commonly used, and we must look elsewhere for the cause of the so-called excessive compression complained of. That this cause is excessive lead, I believe will be clearly shown by the cards in the accompanying figure, which were all taken from the same engine, having Allen valves, under practically the same conditions except a difference in lead, and which clearly prove that the Allen valve can be so set as not to produce excessive compression. (The engine from which these cards were taken had drivers 68 in. in diameter, valves with 5-in. travel in full gear, ⅞-in. outside lap, and Allen ports ½ by 17¼ in., inside clearance $\frac{1}{16}$ in. on each end, cylinders 19 by 24 in., and steam pressure 165 lbs.) On the right hand card, shown herewith, the average back pressure from the beginning of the return stroke up to the point of exhaust closure is seven pounds. Taking into consideration the fact that the drivers were making 267.6 revolutions a minute when the card was taken, and that these are representative cards among hundreds taken under similar conditions, it seems evident that the Allen valve cannot justly be considered as producing more back pressure than the plain valve.

From the foregoing, I feel warranted in drawing the conclusion that the Allen valve, when properly set, does not produce more back pressure or compression than a plain valve under similar conditions.

It is sometimes objected that the Allen port necessitates a weak design, or the valves must be made very heavy. For about ten years the Chicago, Burlington & Quincy Railroad has been using, very successfully, on 19 by 24-in. engines, having steam ports 1½ by 17¼ in., Allen valves weighing only 112 lbs. without packing strips.

Advantages.

It is evident that the Allen valve doubles the speed of the steam port in opening and closing for all cut-offs, and in this respect more nearly approaches the advantages of the Corliss valve-gear than does the ordinary valve. That this is a decided advantage can hardly be successfully disputed. It is equally evident that for all cut-offs, where the maximum port opening does not exceed the width of the supplementary port of the Allen valve doubles the port opening. As the width of the Allen port is quite commonly half an inch, and a maximum port opening of this amount corresponds to a cut-off of 9 in. with the usual locomotive gear, it follows that the Allen port doubles the steam opening for this and all other cut-offs, or for all those commonly used for speeds higher than 10 or 15 miles an hour. It



A—Lead at cut-off, $\frac{11}{32}$ in. B—Lead at cut-off, $\frac{9}{32}$ in. C—Lead at cut off, $\frac{7}{32}$ in.

Indicator Cards with Allen Valve at Speed of 55 Miles an Hour.

therefore appears evident, on theoretical grounds, that the Allen valve increases the power of a locomotive for all speeds above very moderate ones, and that this advantage will be marked for high speeds.

That these theoretical advantages are borne out by practical results is shown by the following quotations from the proceedings of the Western Railway Club for March, 1897: Mr. E. M. Herr, then Superintendent of Motive Power of the Northern Pacific Railway, spoke as follows: "The Allen valve, in my opinion, is a very valuable device if rightly used, and I believe that many railroad men condemn it because they have not used it in the right manner. In making some tests on the Northwestern testing plant, not very long ago, we showed conclusively that at high speeds a 16 x 24-in. engine would develop more power with an Allen valve than a 17 x 24-in. engine, with practically the same size drivers, would develop with a plain valve. In fact, a 16 x 24-in. engine, on a certain division where the ruling grade could be approached on a good run, was put in freight service with 17-in. engines, and did satisfactory work with the 17-in. engines, pulling over rugged parts of the division, until one day the train happened to stop at the foot of this ruling grade. That day the engine stalled, and it stalled simply because it was not as strong as a 17 x 24-in. engine when pulling at slow speeds. At very high speeds it was stronger."

Writing in 1893, Herr Von Borries, Superintendent of Motive Power of the Hanover State Railways of Germany, says: "The latter (viz., Allen valves) are most useful for all fast-running engines. Our people could not do without them."

In the Proceedings of the American Railway Master Mechanics' Association for 1896 will be found the report of their Committee on Slide Valves, from which I quote: "From this (table) it will be seen, as might have been expected, that the mean effective pressure with the Allen port is greater than without it at the ordinary running positions. The average value of all the figures show *20 per cent. greater mean effective pressure* in favor of this valve. It can be considered that the Allen port has enabled the piston to exert 20 per cent. more useful pressure on the crosshead at each stroke. It is also readily apparent that the earlier the cut-off the more is gained by the Allen valves. This is also true in a measure of the increase in speed. It is also clearly demonstrated that a better steam line is obtained." The indicator cards on which these conclusions of the committee were based were made on the Purdue University mounted locomotive, at six different cut-offs, varying from full gear to one-sixth stroke, and at speeds of 10, 20, 30, 40, 50 and 60 miles an hour, with the same valve gear and setting for both the plain and Allen valves.

For engines which are already built it seems plain that the Allen valve furnishes a simple method of increasing their power, and in designing new engines will produce a given power with smaller and lighter valves, because of the shorter ports in the valve seat necessary with this valve, resulting in less strain and wear on the valve gear and seats. It may be urged that a plain valve with longer travel will give as great a mean effective pressure as the Allen valve, but this necessitates a heavier valve and consequent wear to the valve gear, and more power wasted. In this connection it should not be forgotten that the Allen valve enlarges the port opening by a given number of square inches for all cut-offs, while a longer valve travel enlarges it a certain per cent., the number of inches decreasing as the cut-off becomes shorter.

Economy.

Assuming it to be proved that the Allen valve will give greater power than a plain valve, it does not necessarily follow that the economy of the engine will show a corresponding improvement. This will depend on the conditions under which the engine is working. If with the plain valve the conditions are such that the work is done at the most economical point of cut-off, we would not expect any saving in coal by increasing the power; possibly the reverse if the basis of comparison is the pounds of water per indicated horse-power-hour. But if the basis is the cost per ton-mile there can be little doubt that the greater power will secure a saving. That a fuel economy may be the result is shown by Mr. Herr's remarks before the Western Railway Club: "I have endorsed the Allen valve pretty strongly, and I want to say that my experience is just the reverse of Mr. Barr's. The engines in which we put the Allen valve showed quite an apparent fuel economy."

Lead.

Inasmuch as the Allen valve gives a quicker and larger steam admission than the plain valve, it follows that the lead for the former should be less than for the latter. In my opinion it has been the failure to appreciate this fact which has caused many to conclude that the Allen valve has no advantages, but rather the contrary. Not only should the lead for the Allen valve be less than for the plain valve, but must be if the best results are to be obtained. The smaller lead which the Allen valve requires is a decided advantage in several directions, as will be seen by a study of the following table, taken from Zeuner valve diagrams of a gear having ⅞ in. outside lap, ¼ in. inside clearance, 48⅜ in. link radius, 5 in. travel in full gear, and is for 6-in. cut-off:

	Plain Valve.	Allen Valve.
Lead	¼ inch	$\frac{5}{32}$ inch
Lead opens at	22⅞ inches	23½ inches
Maximum port opening	$\frac{30}{100}$ inch	$\frac{24}{100}+\frac{12}{100}=\frac{36}{100}$ inch
Release begins at	13⅜ nches	13⅞ inches
Compression begins at	18 " 1 "	18¾ "

If we assume that the Allen port is half as efficient as the port opening at the end of the valve, the Allen valve has increased the steam-port opening 20 per cent. even after the lead has been reduced nearly 38 per cent. The reduction in lead made possible by the use of the Allen valve has delayed exhaust opening; thus, increasing the period of expansion ¾ in., or 3 per cent., has also delayed exhaust closure ¾ in., or 3 per cent. These results, due to the reduction in lead, are equivalent to reducing the inside clearance from ¼ in. to $\frac{5}{32}$ in. so far as expansion is concerned, and increasing the inside clearance from ¼ in. to $\frac{5}{16}$ in. so far as the effect on compression is concerned. There can be no reasonable doubt that these changes introduced by the Allen valve will increase the power of an engine except at very slow speeds, and will favorably affect its economy except when the engine with plain valves is working under the most favorable conditions, which are rare in railroad service.

*Presented at the Washington meeting of the A. S. M. E. For some notes on the introduction of the Allen Valve on railroads, see Mr. M. N. Forney's letter in Railroad Gazette, June 9, 1899, p. 395.

New York Central Moguls in 1889 and 1899.

A little over 10 years ago the New York Central & Hudson River Railroad had under consideration the policy of adopting heavier freight locomotives. Several conferences were held between Mr. Pitkin, of the Schenectady Locomotive Works, and Mr. Buch-

anan, Superintendent of Motive Power, which resulted in the building by that company of a locomotive for trial which was put in service early in 1889. During the year 1890 as many as 137 engines, all reproductions of this trial locomotive, were built by the Schenectady Locomotive Works for the New York Central and other engines of similar design were turned out by the Brooks Locomotive Works and by other builders. These engines, known as Class J, have been the standard for the freight moguls on the New York Central until recently.

The leading dimensions of one of these engines are given in the accompanying illustration. Without going into details, it may be well to note that these were 19 in. x 26 in. engines with the firebox above the frame. They had a wagon-top boiler with crown bars and a wheel base of 14 ft. The design of these locomotives, as described in the Railroad Gazette, July 25, 1890, showed some characteristic features, particularly in the construction of the front of the cab, in the method of equalizing and in some minor details as the connection between the spring links over the coil springs, which was a flat key inserted in a slot.

The design for a new lot of engines, known as the type P, was adopted in December last and when compared with the engines above referred to show many modifications which are worth somewhat careful study. These new engines haul from 25 to 30 more cars than those of Class J. This comparison is particularly suggestive, inasmuch as the new type does not represent an evolution from the J engines, but is rather a leap in some points of design and therefor enables one to form a pretty accurate notion of the changes in the materials used, the methods employed and modifications in the designs which were required to meet the demands for greater hauling power.

The time, distance and weights of the cars hauled

Cast steel is now used on the new types in place of cast iron for the driving wheel centers and the foot plate.

The driving boxes have been changed from cast to gun iron, and babbit strips in the bearings abandoned.

The side and main rods have been changed from rectangular to I sections.

The piston rod has been extended through the front end of the cylinder.

The front end of the boiler has been changed from cast iron to pressed steel.

A gravity sander has been set aside for a pneumatic sander.

The firebox has been dropped in the Class P engines 9 in. on the front end and has been increased 7¾ in. in length.

The safety valves have been put on an auxiliary dome in the later design. Formerly there were two 3-in. safety valves, while the new engines contain three 3-in. valves.

The boiler has been increased from 57 in. to 66 in. (inside diameter of smallest ring).

Crown bars have been replaced by radial stays.

The length over tube-sheets has been increased from 11 ft. 6⅛ in. to 12 ft. 2½ in.

A brick arch has been put in the firebox, supported on water tubes.

All longitudinal seams are new sextuple riveted, where formerly they were lap joints with single inside welts The firebox is double riveted in place of single in the former design. Hydraulic flanged steel rings connect the steam dome to the wagon top in place of flanging the top sheet of the wagon top.

The new locomotives are counterbalanced to conform to the M. M. recommendation and the counterweights are crescent shape instead of prismatic.

In the former design the brakes were hung in front, while in the new type they are hung behind the drivers.

The steam for all auxiliaries is taken from a combination turret in the cab.

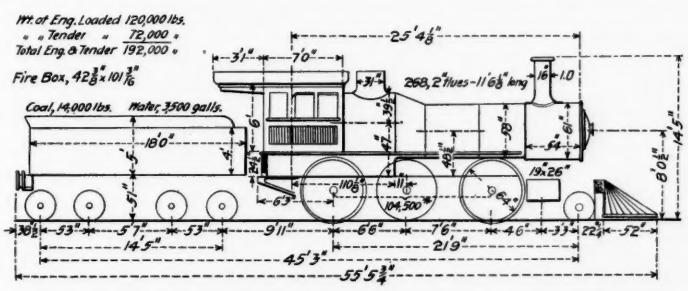
No. 9 monitor injectors have been replaced by a No. 10.

The steel running board is used instead of a wooden board.

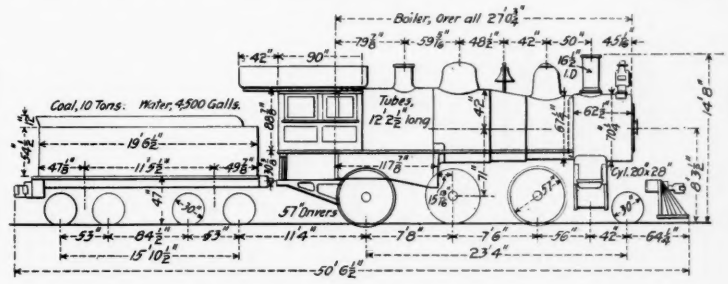
ter till they meet the arcs from the adpoining centers. Now let very low weekly or semi-weekly excursion rates be made between all the towns included within the arcs described from any one center, and that center. The farther the towns are from the center, the less should be the rate per mile.

We at once lay ourselves open to the charge of discrimination, but is it not a justifiable discrimination, and one that will result in the greatest good to the greatest number, the railroad company included? It would indeed in one sense be given to him that hath and taking from him that hath not, but it would be in a truer sense giving to him that hath not.

Let us see what some of the results of such a policy would be. The only person to be damaged is the village merchant. Those who gain are the city merchant, the village residents not merchants, the railroad company, and best of all, from the popular standpoint, the farmer. The village will not be destroyed, there will still be room for merchants, perhaps not so many. The large centers will increase in importance more rapidly by virtue of the increased business brought to them. The railroad will gain largely in passenger revenue. It might seem at first thought that there would be a small loss in way freight, but this is at least doubtful. The farmer and the villager gain in securing a better market in which to buy. In all parts of the country there are more or less regular excursions to popular resorts and this business pays. Why not such a system as is here suggested? The centers should be chosen with reference to the running of trains, or trains should be arranged with reference to the excursions. A local train, to be convenient, must bring the outsiders to the city in the morning and take them home in the afternoon or evening. Such excursions need not of course interfere with



Mogul Freight Locomotive, Class J, 1889.—N. Y. C & H R. R. R.



Mogul Freight Locomotive, Class P, 1898.—N. Y. C. & H. R. R R.

are about the same for both classes of engines. During the first two weeks in June, 1898, Class J locomotives hauled 45 loaded cars, while during the first two weeks in June, 1899, Class P locomotives hauled 68 loaded cars.

These new engines are 20 in. x 28 in. moguls, weighing when loaded 152,000 lbs., and with the tender 248,800 lbs. One feature of the design may be observed by a study of the accompanying diagrams. In the Class J engines the distance between the front and main wheels was made greater by 12 inches than that between the main and rear wheels. In the P locomotives the total engine wheel-base has been increased 19 inches and the distance between the front and main wheels is two inches less than between the main and rear pair—or the two are practically the same. While there was no objection to the former design, it was not a common arrangement.

In order to facilitate the study of the principal changes in the two classes, the general dimensions of each have been arranged in the following table:

General Dimensions of Freight Engines—N. Y. C. & H. R. R. R.

	CLASS J, 1889.	CLASS P, 1898.
Cylinder diameter and stroke	19x26 in.	20x28 in.
Steam port	18x1¼ in.	18x1¼ in.
Exhaust port	18x3 in.	18x2¾ in.
Bridges	1⅝ in. wide	1¼ wide
Valves, Richardson	Patent balanced	American balanced
" travel	5¾ in.	5½ in.
" outside lap	⅞ in.	⅞ in.
" inside lap	⅛ in.	⅛ in.
Exhaust nozzle (double) diameter	3¼ in.	3¼ in.
Smoke stack (I. D.)	16 in.	16⅛ in.
Boiler diameter, smallest ring (outside)	58 in.	67⅛ in.
" pressure per square in	160 lbs	180 lbs.
Firebox, length outside	110¼ in.	117⅛ in.
" width outside	50 in.	47⅞ in.
" depth inside	62 in.	80 (front) 68 (b'k)
Fire grate, length	101⅞ in.	108¼ in.
" width	42⅜ in.	38⅞ in.
" area square feet	29.7	29.33
Flues, number	266	371
" outside diameter	2 in.	2 in.
" length between sheets	11 ft. 5 in.	12 ft. 1⅛ in.
" heating surface square foot	1,600	2,372
Firebox, heating surface square feet	163	211
Total " " " "	1,763	2,583
Weight engine, working order	120,000 lbs.	152,000 lbs.
" on drivers	104,500 lbs.	131,600 lbs.
" on truck	15,500 lbs.	20,400 lbs.
" maximum, tender loaded	72,000 lbs.	96,800 lbs.
Kind of brake	W. A. B. Co.	American-Westinghouse
Driving journals	7½x9 in.	9x12 in.
Engine journals	5½x10⅝ in.	10x16¼ in.
Tender "	4½x7 in.	4½x8 in.
Crank pin, main	5¼x6 in. and 5¾x5¼ in.	6x6 in. and 6¾x5¼ in.
" front	4½x3¾ in.	5x3¾ in.
" rear	4½x3½ in.	5x3¾ in.
Ratio heating to grate surface	.0169	.0113
Tractive force per pound, M. E. P.	146.56	196.5
Adhesion to tractive force	.19	.23

A study of this table will reveal a general tendency to increased dimensions and weights. The following condensed notes show the differences in the general design:

An iron pilot takes the place of a wooden pilot.

The main air reservoir has been increased so as to hold 40,000 cu. in. The braking power has been increased to 70 per cent. of the light weight of the locomotive and to 95 per cent. of the light weight of the tender.

In the former design the boiler was lagged with a wooden jacket. On the new engine the H. W. Johns Manufacturing Co.'s asbestos is used.

In the J type, hollow staybolts were used; in the new design the bolts are drilled 1¼ in. deep in the outer ends.

The pistons were formerly built up; in the P type they are made in one piece and cored.

The piston rods were of hammered iron in the 1888 design and are now made of Cambria steel.

The side and main rods in the old design were made of hammered iron and in the new are of mild open hearth steel.

Excursion Rates A Source of Revenue.*

By Prof. Wm. G. Raymond.

Besides classification of passenger business, another plan for increasing revenue suggests itself, viz., the adoption of a systematic scheme of excursion rates.

By this is not meant excursion rates once or twice a year to school children and college students, nor excursion rates to associations of various kinds, though such rates properly protected could be made a source of much larger revenue than now by making them lower. For every hundred-millionaire in the world there are several hundred millionaires; for every man worth $100,000 there are several thousand worth $1,000; and for every school teacher who can afford to pay $10 for an excursion to a convention there are perhaps a thousand who could and would afford to pay $1, and several hundred who could and would pay $2.50 or even $5. When these people can be carried in regular trains their fares are practically so much net gain, and when it is necessary to run extra trains, it must not be forgotten that it costs only 40 cents to 50 cents a mile to run extra trains, and this is paid for by a single carload at 1 cent a passenger mile, by two carloads at a half cent per passenger mile, and by four carloads at a quarter of a cent. But this more or less irregular excursion business is not the excursion business that is suggested.

Let the passenger department of any road select the several large towns or cities along its main line and with each as a center, and radii of one mile, two miles, etc., describe arcs cutting the main line and branches. These arcs are continued from each center till they meet the arcs from the adpoining centers. Now let very low weekly or semi-weekly excursion rates be made between all the towns included within the arcs described from any one center, and that center. The farther the towns are from the center, the less should be the rate per mile.

We at once lay ourselves open to the charge of discrimination, but is it not a justifiable discrimination, and one that will result in the greatest good to the greatest number, the railroad company included? It would indeed in one sense be given to him that hath and taking from him that hath not, but it would be in a truer sense giving to him that hath not.

Let us see what some of the results of such a policy would be. The only person to be damaged is the village merchant. Those who gain are the city merchant, the village residents not merchants, the railroad company, and best of all, from the popular standpoint, the farmer. The village will not be destroyed, there will still be room for merchants, perhaps not so many. The large centers will increase in importance more rapidly by virtue of the increased business brought to them. The railroad will gain largely in passenger revenue. It might seem at first thought that there would be a small loss in way freight, but this is at least doubtful. The farmer and the villager gain in securing a better market in which to buy. In all parts of the country there are more or less regular excursions to popular resorts and this business pays. Why not such a system as is here suggested? The centers should be chosen with reference to the running of trains, or trains should be arranged with reference to the excursions. A local train, to be convenient, must bring the outsiders to the city in the morning and take them home in the afternoon or evening. Such excursions need not of course interfere with periodic excursions from large cities to still larger ones. Is it not true that cost per passenger mile is more often considered than cost per train mile? And is it not true that this is apt to lead to erroneous ideas as to the probable result of low excursion rates?

Finally, it might be worth while for our enterprising general passenger agents to study with some care the very liberal and extensive excursion arrangements of the railroads of Great Britain.

*For an article on passenger Classification in its relations to revenue, see the Railroad Gazette Feb. 10, 1899. p. 97.

The Beginnings of American Engineering.*

The history of engineering in America is naturally divided into four periods:

First—That from 1785 to 1800, embraced in the earliest public works of the country of the nature usually undertaken by the civil engineer.

Second.—That from 1810 to 1830, beginning with the revival of works of internal improvement after a long period of inaction, and extending to the invention of the railroad.

Third.—That from 1830 to 1848, beginning with railroads and extending to the formation of the engineering societies.

Fourth.—That from 1848 to the present time.

Only a rapid survey of the first three of these periods will be attempted. . . .

To John Bellendine, of Fairfax County, Virginia, a person described as possessing skill and judgment in water-works, is probably due the credit of first putting in definite form a scheme for connecting the Potomac River with the Monongahela, and the James with the Kanawha. . . .

Washington, who was almost an engineer, had already planned projects for connecting the Atlantic Coast with the almost unknown wilds beyond the Alleghenies. . . . Washington was largely instrumental in procuring from the legislatures of Virginia and Maryland a charter incorporating the Potomac Company, formed for the purpose of opening the waters of Chesapeake Bay to navigation from the interior rivers of the States, and ultimately to connect with the Ohio River. This was the earliest charter for any work of considerable magnitude worthy of being classified under engineering. Washington was elected the first president of the company in 1785, and, after subscriptions of stock, the work of improvement began. . . . Work on the Potomac Canal languished toward the last of the century, and in common with all the other great undertakings of the day, slept until awakened many years later, when the Chesapeake and Ohio River Canal, which absorbed all the works of the old Potomac Company, was formed in 1823.

On January 5th, 1786, an act for cleaning and improving James River was obtained. Under this act the old James River Company constructed a canal around the falls on James River, extending from Richmond to Westham, a distance of about seven miles, and improved the bed of the river by sluices as far as Buchanan. The Dismal Swamp Canal, ex-

*Extracts from an address at the annual convention at Cape May, N. J., June 27th, 1899, by Desmond FitzGerald, President, Am. Soc. C. E.

tending from a point on the Elizabeth River, near Norfolk, to Albemarle Sound in North Carolina and passing through the Great Dismal Swamp, in the states of Virginia and North Carolina, was chartered in 1787, and a large amount of work was done before the close of the century. . . . In 1784 South Carolina started a project for the construction of the Santee Canal, the first true canal in the country. This canal was 22 miles in length, and was built for the purpose of connecting the Santee River with the tidal headwaters of Cooper River, which empties into Charleston Harbor. The charter for the Santee Canal was obtained March 22d, 1786. Work was begun in 1793, and the canal was finished in 1800. . . . The Chief Engineer and Director was Colonel Christian Senf, a Swedish engineer, who was at that time Chief Engineer of the State of South Carolina. The total rise and fall of the canal was 103 ft., overcome by eight single and two double or coupled lift-locks, varying from 5 to 10 ft. lift, and built of stone or brick masonry with wooden gates. The boats were 54 ft. long, 9 ft. beam and 2½ ft. draft. The average dimensions of the canal were 35 ft. wide at top, 20 ft. at bottom, and 4 ft. depth of water. The canal was furnished with 25 flood gates, several overfalls, abutments and walls for bridges, and for 13 miles of its course the digging was 15 ft. deep. The work was constructed by negro laborers, two-thirds of them being men and one-third women, and they were paid £15 to £16 per year. . . .

A project which was proposed and discussed long before the Revolutionary War, in fact by Penn, in 1690, was that of uniting the Schuylkill and Susquehanna rivers by a canal. The first explorations were made by a Committee of the American Philosophical Society in 1770. The same route was surveyed again, a little later, by the astronomer, David Rittenhouse. In 1789 a few public spirited citizens formed an association and proposed various plans to the Legislature, and in the following year commissioners were appointed to explore several routes. This action resulted in the formation of two companies. . . . Unfortunately there was no engineer at that time in Pennsylvania competent to aid the committees; they, therefore, sent to England and engaged Mr. William Weston, an engineer of reputation, to come out and manage both works. . . . In December, 1794, five locks of 6 ft. fall and two road bridges had been completed, and progress had been made on the sixth lock. In this, state work was suspended, with $250,000 spent. . . . In spite of every effort the work languished, and in 1796, when nearly 6 miles of the canal were navigable, the work entirely ceased. The sum of $221,710.06 had been spent on this undertaking. In 1811 these two companies were galvanized into life under the name of "The Union Canal," but no active operations were begun until 1821, when this historic work was begun and pushed to completion, in 1827, sixty-five years after the first survey, at a cost of $1,600,000.

The Schuylkill navigation was among the earliest works of this period. It was chartered in 1815, and work was commenced in 1816. The entire length of works controlled by the company, including slackwater navigation, was 108 miles. There were 31 dams and 120 locks in this distance, and the total lockage was 620 ft. Navigation was opened in 1825 for boats carrying 18 tons. The engineer was Thomas Oakes, and some of the works built by him are still in use. Oakes must have been an engineer of ability, and he probably came from England. . . . Many years before the close of the eighteenth century public attention had been directed toward the great valleys of the Mohawk and Hudson as furnishing a means of water communication between the city of New York and the Great Lakes. The first steps were not taken, however, until March, 1791, when an act was obtained to open communication between Wood Creek and the Mohawk River, and also providing for a connection between Lake Champlain and the Hudson. The latter was known as the Northern Canal and the former as the Western Canal. Under this act Mr. Abraham Hardenbergh, a skillful and experienced surveyor, assisted by Mr. Benjamin Wright, made the survey in September and October, 1791. Mr. Wright was destined later to a career of fame as one of the first native civil engineers in America. . . .

Following closely on the construction of the southern canals came the great undertaking of that day in New England—the Middlesex Canal, which had the honor of being the second real canal constructed in the United States. The charter was obtained in June, 1793, under the title of "Proprietors of the Middlesex Canal." Samuel Thompson, of Woburn, afterward Count Rumford, was engaged to run the levels, but the accuracy of his work was doubted by the directors, and on March 1st, 1794, Col. Loammi Baldwin was authorized to proceed to Philadelphia and secure the services of Mr. Weston, who ran the levels in July, and on August 2d endorsed the feasibility of the canal and estimated the expense at $500,000. . . . The water was let into the canal in 1802, and it was opened for public use in 1803.

The great work which was to create the new profession of the engineer was the Erie Canal. . . . Some of the preliminary surveys were made as early as 1808, but it was not until July 4th, 1817, that the actual work of construction was begun. It was finished in 1825 and opened with great pomp and parade. The total length from Albany to Buffalo was 363 miles. The canal was 40 ft. wide at the top, 28 ft. wide at the bottom, and was 4 ft. deep. There were 84 locks on the main line, each 15 ft. by 90 ft. The total lockage was 688 ft. On the canal were 18 aqueducts, some of them fine stone structures, notably that over the Genesee River, which was 804 ft. long and contained 11 arches. Among the aqueducts across the Mohawk there was one with a length of 1,188 ft. One of the embankments was 72 ft. in height. The cost was upward of $10,000,000. . . .

The line was divided into three divisions, in charge of James Geddes, Benjamin Wright and Charles Brodhead, and these men, with a few able associates, took up the burden, and, with faces turned toward the future, proceeded to execute the work. . . . Geddes was a judge in the county in which he resided and was 54 years of age. Wright was also a judge and had passed his 46th year. Bates and Roberts, their associates, were also judges. To understand the situation correctly we must turn backward a page. In almost every frontier settlement could be found some man, more gifted than his fellows, who laid out farms, settled petty controversies in his county and became a judge, thus uniting surveying and the execution of the law. They were generally men of courage, energy and skill, and accustomed to solving all sorts of problems. They were essentially men of action, and many of them were men whose lives had been spent in the hard school of adversity.

Benjamin Wright was born in Connecticut on October 10th, 1770. At an early age he began the work of surveying farms at Fort Stanwix, on what was then the border of civilization. . . . James Geddes was born in Pennsylvania on July 22d, 1763. When an appropriation of $600 was made for some of the preliminary surveys of the Erie, Geddes was selected. He made a survey from Oneida Lake to Ontario, from Lewiston to Niagara Falls, and from Buffalo to a connection with the Seneca River, all for the sum of $673, and reported that a canal from Lake Erie to the Hudson was feasible.

Canvass White, one of the junior engineers employed upon the canal, was born on September 8th, 1790, had had a fair common school and academy education and was a man of scholarly instincts. In 1817 he left the work of construction and visited Europe for the purpose of studying canals in the old world; he traveled 2,000 miles on foot and brought back to the Erie Canal plans and instruments which were of incalculable benefit to the work. The structures built on the canal after his return were laid in cement made from rock which he discovered. . .

The action of New York in regard to the Erie Canal was the means of kindling enthusiasm in other States, and many canals were started all over the country. A large number of engineers found employment in carrying on the surveys for these works and in superintending their construction.

Besides the names already mentioned, the following engineers began their careers on canal construction: John B. Jervis, Horatio Allen, William J. McAlpine, David S. Bates, Nathan S. Roberts, William M. Roberts, Jesse L. Williams, Major David B. Douglass, Jonathan Knight, Sylvester Welch, Ashbel Welch, Edward Miller, Samuel Forrer, James Worrall, Samuel H. Kneass, John Wilson, W. Hazell Wilson, and the list hight well be extended to include others. Some of these engineers were later prominently identified with railroad enterprises and their careers more properly belong to that era. . . . As a search for the fathers of the profession must, undoubtedly, be made among these early canal engineers, the careers of four of the most prominent have been selected for examination. They are James Geddes, Benjamin Wright, Loammi Baldwin and John B. Jervis, and their names are mentioned in the order of their birth.

In addition to his work on the surveys of the Erie Canal, James Geddes, in 1818, was appointed Chief Engineer of the Champlain Canal, and remained in charge of its construction until 1822, when he was selected to make the surveys for a canal from the Ohio River to Lake Erie, and in 1823 was called to Maine to locate a canal from Sebago pond to tide water at Westbrook. In 1827 he entered the service of the General Government on the location of the Chesapeake & Ohio Canal, and in 1828 was employed by Pennsylvania on canals in that State. He died on August 19th, 1838, at the age of seventy-five.

While Benjamin Wright was engaged upon the building of the Erie Canal he was consulted on the Northampton, Blackstone, Chesapeake and Delaware Canals and by the State of Virginia on a proposed canal from Richmond to the Ohio. In 1824 he became Chief Engineer of the Chesapeake & Delaware Canal, and in 1825 Consulting Engineer for the Delaware & Hudson. In 1828 he became Chief Engineer of the Chesapeake & Ohio Canal, a position which he resigned in 1831. In 1832 he was appointed Street Commissioner of the City of New York, and subsequently Chief Engineer of the Hudson Railroad and Consulting Engineer of the St. Lawrence Ship Canal, Canada, and also of the Welland Canal. Later, he was employed to survey the route for the New York and Erie Railroad, and in 1835 he was called to Havana to advise on railroad projects. During the next four years he was engaged on several canal and railroad plans, but remained principally in Virginia, to which State he had been invited after the completion of the Erie Railroad survey. He died on August 24th, 1842, being then nearly seventy-two years of age.

Loammi Baldwin was born May 16th, 1780. He was the son of Col. Loammi Baldwin, who superintended the construction of the Middlesex Canal. The son, also a colonel, was graduated from Harvard College with the famous class of 1800. In 1807 he visited England to study engineering. One of his earliest works was the construction of Fort Strong on Noddle Island. Between the years 1817 and 1820 he was employed in Virginia on various works of internal improvement. In 1821 he was appointed Engineer of the Union Canal in Pennsylvania. In 1824 he was in Europe, and it was at this time that he laid the foundation for his large library of works on engineering. From 1827 to 1834 he was employed in designing the masonry dry-docks at Charleston, Mass., and at Norfolk, Va., for the Government, both of these works being carried on at the same time. It was in 1834 that he made an able and elaborate report on the proposed water supply of Boston. His death occurred June 30th, 1838, at the age of fifty-eight.

John B. Jervis was born December 14th, 1795. His education was only such as could be picked up in the common schools of a new country. In 1817 he began his engineering career as an axeman on the Erie Canal, but was soon made Resident Engineer and was advanced to several responsible positions, remaining on the work until its completion in 1825. The following is a brief summary of his remarkable career:

1825-30. Chief Engineer of the Delaware and Hudson Canal.
1830. Chief Engineer of the Albany and Schenectady Railroad, and soon afterward Chief Engineer of the Schenectady and Saratoga Railroad.
1833. Chief Engineer of the Chenango Canal.
1836. Chief Engineer of the Croton Aqueduct.
1846. Consulting Engineer of the Cochituate Water-Works.
1847. Chief Engineer of the Hudson River Railroad.
In 1850 he visited Europe, and on his return was made Chief Engineer of the Michigan Southern and Northern Indiana Railroad.
1851. President of the Chicago and Rock Island Railroad.
1861. General Superintendent of the Pittsburg, Fort Wayne and Chicago Railroad.
1864. Chief Engineer of the Pittsburg, Fort Wayne and Chicago Railroad.
In 1868 he was made one of the first trustees of the Rome Merchant Iron Mill Company.

For more than seventy years Mr. Jervis was an active worker in his profession, and at the advanced age of eighty-three he wrote a lecture on "Industrial Economy." In December, 1881, he was summoned to New York by Isaac Newton and E. S. Chesbrough in consultation on the plans for the new Croton Aqueduct. He was then eighty-six years of age. Mr. Jervis died January 12th, 1885. Owing to his wonderfully long career I am obliged to trespass upon the fourth period of American engineering, beginning with the formation of the engineering societies, as Mr. Jervis became a member of this Society in 1867 and an honorary member in 1868. . . .

Railroads in Jamaica.*

The principal mode of travel in the larger part of the island, until the last few years, was by carriage, there being a network of excellent roads. For some time there had been a steam railroad for a short distance from Kingston into the interior.

Some four years ago this road was extended 113 miles northwest to Montego Bay and 75 miles northeast to Port Antonio, thus connecting the three principal towns of the island. The road was built by an American company. The government gave over the old road, made certain land grants, and guaranteed bonds. There was great friction and litigation growing out of government claims on account of construction, the company failed, and the government is now about to take over the railway. The cars are principally in the American style, and the locomotives also, except on the old portion of the line, where they still use English locomotives and compartment cars. Ordinary coaches for the masses are called third class, and the rate of fare averages 2 cents a mile. These cars have compartments cut off for a small number of first-class passengers, who pay an average of 4 cents a mile. The time occupied in making the run to Port Antonio is about four hours, and to Montego Bay about six hours. There is quite a climb over spurs of the mountains.

For some years there has been a horse railroad in Kingston, but an electric road covering the lines of the old horse cars and other thoroughfares as well has just been completed. This new line has about 25 miles of track in and around Kingston, divided into three districts, viz., the lines north of the city, those east of the city and those in the city. It is a private enterprise, started by Canadian capital, and is called the West India Electric Company. The government license is for a period of thirty years, renewable for further periods at the pleasure of the Governor. The company pays 4 per cent. of its gross earnings to the government, and assumes the maintenance of the roads and streets occupied by it to the extent of 18 in. on each side of the tracks.

The rates of fare on this road are 2d. (4 cents) for each passenger from any point within a district to another point in the same district by most direct route; that is, the fare is practically 2d. for each section of the line, and from the end of the line to the east, through the city to the end of the line north, would be three fares or 6d. (12 cents). In addition, the company reserves three front benches on each car, on which a first-class fare—3d. (6 cents) instead of 2d.—is charged.

Tickets are sold as follows: Seven 2-penny tickets for 1s. (24 cents), five 3-penny tickets for 1s., and ten children tickets, for under 12 years, for 1s.

Passengers are allowed to stand. There is no difference, in this respect, from conditions which prevail at home. There are no restrictions as to number of passengers carried, and the same complaints of overcrowding are heard. Cars run every fifteen minutes in the city. In addition to regular motors, this company runs market cars before 9 a. m. and after 5 p. m. for country people who carry produce. These cars are trailers, and the fare on them is 1½d. (3 cents).

*A consular report submitted in answer to inquiries by a correspondent.

Some Notable Exhibits.

Two years ago the Goodwin Car Co. exhibited at the M. C. B. Convention four dump cars built partly of steel and partly of wood. Since that time four different styles have been designed and built, each style embodying such improvements as were indicated by previous experience. This year five Goodwin cars were shown at the Old Point Comfort Convention, being part of a train of 20 cars leased for eight months at $5 per day per car; they can be used for carrying sand or coarser materials up to rocks weighing 12 tons. These latest cars are made entirely of steel and malleable iron, have two four-wheel trucks and a capacity for 56 cu. yds. of material. Three years ago the Goodwin cars were made of wood, had four wheels and a capacity for only 15 cu. yds. of material.

Similar dump cars have also been built by the Goodwin Co. which could be covered when it was desired to haul grain. Without making any change

in the car body itself, a crate is bolted to the sides, bringing them up to the usual height of box cars and as the additional pieces are made in sections, they can readily be handled without machinery. When the crate and roof is in place, such cars have a capacity for 700 bu. of wheat, with the usual air space over the grain. If desired grain can be hauled one way and coal the other, the capacity of the cars being 93,000 lbs. of soft coal. Most materials can be discharged from the Goodwin cars in less than five minutes.

It is stated that the center of gravity of the Goodwin car, when carrying a load of 100,000 lbs., is about the same height above the rail as that of an ordinary hopper bottom car. When empty the center of gravity of the Goodwin car is lower than that of the usual box car.

One of the most interesting exhibits at the Old Point Comfort Conventions this year was that of the Pressed Steel Car Co. This consisted of a number of new steel cars as well as cars that had been in service from one to two years.

There was shown a new 100,000-lbs. capacity Lake Shore & Michigan Southern hopper bottom car which is said to represent the latest development in steel car building. This is one of a thousand cars built for hauling coal, coke and ore. It has a new unlocking device designed by Mr. Schoen which is quite simple and is so protected that there is little danger of its being damaged and rendered inoperative.

Another 100,000-lbs. capacity coal and ore car was shown that had been in almost continuous service on the Pittsburgh, Bessemer & Lake Erie for the past two years, and with the exception of the paint it peared to be as good as new. Another car which had been used in the ore trade for 17 months on the Monongahela Connecting RR. showed no signs of wear, even the paint being in good condition. The same might be said of a 100,000-lbs. capacity hopper bottom coal and coke car of the Pennsylvania Lines West of Pittsburgh, and a 95,000-lbs. capacity car of the Baltimore & Ohio, both of which had been in service about one year. A new Union Pacific 95,000-lbs. gondola car was also shown. Some of these cars were equipped with Fox and Schoen pressed steel trucks, while others had Schoen arch-bar trucks.

The exhibit of the Chicago Pneumatic Tool Co. afforded an opportunity for the members of the Associations to see what progress has recently been made in pneumatic tools. This, in addition to being an elaborate exhibit, was particularly interesting, as many of the tools were shown working and probably this exhibit attracted more attention than any other at the Convention. Boyer hammers for chipping and caulking were shown at work in four different sizes, while there were three different sizes of hand riveting hammers; plates were riveted with ¾ and 1 in. rivets with the hand hammers, and 1¼ in. rivets were driven with the yoke riveters. A new form of yoke riveter was shown which will be described in a future number. Boyer, Whitelaw, Heisler and Phoenix drills and boring machines were shown working, as well as Hendricson's and Mackenzie's flue cutters and rollers, Whitelaw's staybolt nipper, a new flue reducer, expander and welder, and a flue cleaner. Other tools, shown in working order, were reversible pneumatic chain hoists and Curtis hoists, valve facing machines, steam joint grinders, casting cleaners and foundry rammers. A very ingenious air hose coupling was shown which automatically shuts off the air supply when the hose is disconnected. The compressed air used to drive the tools was furnished by a Fairbanks-Morse compressor.

International Association of Car Accountants.

This Association, which was established in 1875, held its 24th annual meeting at Saratoga, June 20 and 21. The convention was presided over by Mr. H. G. Sleight (Terre Haute & Indianapolis), the President, at whose suggestion the first meeting of Car Accountants was called in 1875. The first Committee report was that of the Committee on Constitution, T. S. Bell (P. RR.), Chairman. This Committee presented an admirable draft of Constitution and By-Laws, which was adopted substantially as submitted. One of the principal changes in the Constitution is in its statement of the object of the Association, which now reads:

"The object of this Association shall be improvement in the methods of car accounting and car service and the establishment of uniform practice by the several companies comprising the Association."

A spirited discussion followed the reading of the report of the Committee on Car Tracers, A. B. Wilmer (M. & O.), Chairman. Mr. Collins (M., K. & T.), emphasized the necessity for each company enforcing some method of ridding its line of delayed foreign cars. The M., K. & T. has a "Receipt Record Card," which accompanies the billing of each car from point of receipt until the car is delivered home, whether the same moves loaded or empty. Foreign cars returning empty to original point of receipt require no empty car bill—the receipt record card serving the purpose of a card way bill—all other movements empty of foreign cars (except stable cars and coal cars going to mines) must be on empty car bills. This method works admirably in reducing the number of delayed cars. Wherever a car may be, the agent or yard master has in his office the return card, and knows the length of time which has elapsed since each particular car was originally received by the M. K. & T. Empty car bills bear instructions requiring that when the receipt record card shows that a car has been on the road a certain number of days it must be empty car billed to the proper junction for home.

Conductors and agents must note "S. H." against such cars on reports and a special card is attached to the car. There is no excuse for any misunderstanding or improper handling. The special instructions to send a foreign car home read simly (for example): "A. B. & C., 12,345, S. H."

Mr. E. M. Collins (M. K. & T.) read a paper on the modern car record office. Equipment can not be economically handled by the distributing office without the cordial co-operation of the Record office. Record office reports and records must not be taken from the Record Office even for a brief period, so that this office must be closely associated with the distributing office. Station Car Report should show the car initial, number, kind of car, kind of freight, train received by; date and time received; date and time placed; date and time released; (amount of car service collectible, when a station is not under the jurisdiction of a Car Service Association) date and time forwarded; train; kind of freight; destination. For cars loaded or received from connections, the capacity, number of tons of contents, and, if cotton, the number of bales; with information under head of "Remarks" as to switch cars, cars transferred from or to; company freight; leaky roof; bad orders, etc. The original report should be sent to the Record Office and a tissue to the Local Distributor (usually the Chief Train Dispatcher). Agents should see that cars on home tracks and also on the tracks of other lines, whether for switching, transfer or otherwise, are not permitted to remain idle under load or empty one moment unnecessarily; that patrons are constantly urged to release promptly cars being loaded or unloaded, and in this Agents should be supported by a Car Service penalty, preferably by placing the station under the jurisdiction of a Car Service Association.

When cars meet with delay beyond a reasonable time, a brief explanation should accompany the Car Report and tissue thereof. The Local Distributors should check the reports and explanations daily. Once a week the Local Distributor should send to the Record Office for certain dates, say the 7th, 14th, 21st and last day of the month, the tissue car reports, together with all explanations that have been accumulated.

The Record Office should check to see that the tissues are received for every station and that explanations are furnished for every delay for which an explanation is due.

The Record Office should report to the Distributing office all cases of violation of instructions, such as using home cars where foreigns should be used; using high capacity cars for light weight freight; using light capacity cars for heavy weight freight, and all cases of light loading.

The Record Office should report all irregular movements of home or foreign cars, loaded or empty, and all unreasonable delays. It should be in a position to show on a moment's notice the total number or individual number of each kind of car charged each foreign road; and should furnish statements showing average mileage per car per day of each foreign road's cars on the home road, so that any unusually low average movement may be detected and remedied before it results in diversion of business. Statements should be furnished showing the average miles per car per day of home cars on each foreign road in order that the Distributing office may intelligently determine into what channel cars should be allowed to run freely.

It is desirable to have also a statement of Car Service collectible from stations not under Car Service Associations. Statements should be made showing the situation with respect to debit and credit account when there is an arrangement to equalize loaded and empty mileage or the interchange of certain cars.

The discussion on this paper related principally to "book records." Mr. Bell (Pennsylvania) inquired whether any member had a book record which was sufficiently flexible to allow of the adjustment of work by record clerks where books were provided at the end of each month for the succeeding month's business. Frequently, an assignment to each book, which in the latter part of one month would equally distribute the records to the extent of say approximately two thousand records per day to each man, would, by the middle of the month, in consequence of change in traffic conditions, necessitate some men working less than the two thousand records each, while others would be overworked by reason of the increasing movement of the cars assigned owing to changes in the flow of traffic. Several methods of overcoming the difficulty were described. Thumbscrews are used to attach leaves to the top of the desk, these being bound in permanent form after the work for certain periods has been entered. These periods vary from one month to one year. No satisfactory temporary binding has thus far been devised to enable the adjustment of leaves during the month. Mr. Lindley (C. B. & Q.) stated that he divided foreign records, so that during normal conditions each foreign record clerk would have three books, bound in light card board covers, which were so attached that the three books could be worked as one without interfering with the leafing. Under abnormal conditions he could reduce the number of books per man to two or increase it to four.

In connection with the report of the Committee on Car Service, F. D. Lindley (C., B. & Q.), Chairman, attention was called to the increase in minimums recently effected in western territory. This evoked considerable discussion on the large car problem and the Committee on Large Cars was directed to ascertain whether a reduction in the minimum classification for vehicles is not desirable.

This report once more emphasizes the hackneyed but still forcible arguments in favor of some plan of settlement for car hire that will place a penalty upon delays and furnish an incentive to better homeward movement. From year to year the Car Accountants have persistently shown the importance of this subject in its relation to economy and efficiency. The Car Service Committee apparently discerns some signs that managers are awakening to the need of action and it believes that what the Association is doing each year will serve as a gentle reminder to them if nothing more.

The Daily Mileage Per Diem and Exchange Plan comes in for favorable comment in the report of this Committee. It is recognized as being better than the present method, in that up to the exchange of days it is straight per diem without an arbitrary rate, and they suggest that a trial be given it by a sufficient number of roads to demonstrate its usefulness.

Mr. G. H. Waldo (C. H. & D.) presented a paper on the subject of Car Records, in the course of which he outlined some changes recently put in use by different roads in connection with the graphic or block method.

The Committee on Tonnage, J. P. Johnson (S. A. L.) chairman, made an elaborate report describing in detail the methods most commonly used in computing tonnage for loading freight trains and in summarizing tonnage reports for getting at the averages required for superintendents' statistics and for annual reports. The Committee concluded that the views and needs of different roads were so varied that it would be impossible to devise uniform blanks for these reports. The general use of tonnage rating for freight trains affords the car accountant his best opportunity to elevate his department to the high place it deserves to occupy.

The Committee on Recommendations, J. P. Driscoll (C. P.), Chairman, submitted a report codifying the various resolutions adopted by this Association since its organization, which was received, and its recommendations adopted, with changes in certain sections pertaining to the return, on request, of cars in switching service and the rate of mileage on special equipment to adjust the codified rules to the present practice prevailing on roads represented in the Association.

Hot Springs, Va., was chosen as the place of the next meeting (May, 1900).

Election of officers resulted in the unanimous choice of T. S. Bell (Pennsylvania), President; C. C. Riley (Baltimore & Ohio Southwestern), Vice-President; G. S. Russell (Burlington, Cedar Rapids & Northern), Secretary; F. M. Luce (Chicago & Northwestern), Treasurer.

Convention of Car Service Managers.

The tenth annual meeting of the National Association of Car Service Managers was held at the International Hotel, Niagara Falls, on June 19 and 20. There was a good attendance of members from about twenty-five associations, covering the territory from New England to Missouri River points. The Canadian railroads were represented this year in the person of Mr. John Earls. The President, Mr. R. A. Taylor, of Richmond, Va., presided.

Papers were read as follows: "The Private Car," by W. M. Prall of St. Louis, Mo. "Refunding of Car Service Charges Caused by Errors of Other Roads," by J. C. Haskell of Atlanta, Ga., and also on the same subject by A. G. Thomason, of Scranton, Pa. The following topics, among others, were informally discussed: "Charges on One Man's Private Car When Delayed on the Private Tracks of His Customer," by A. J. Elliott of Peoria. "What Should Be Considered House Freight," by C. W. Sanford, of Chicago. "The delay in arrival of bills lading when sent through banks," by Mr. Elliott.

The two formal papers of greatest length, those of Mr. Thomason and Mr. Haskell, were on the same subject, refunding car service charges which accrue on account of errors made by other roads. Mr. Thomason reviewed the discussions on this subject that have been had in the Association during the past four years. Resolutions have been adopted by the

(Continued on page 476.)

RAILROAD GAZETTE

ESTABLISHED IN APRIL, 1856.
PUBLISHED EVERY FRIDAY,
At 32 Park Place, New York.

EDITORIAL ANNOUNCEMENTS.

Contributions.—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussion of subjects pertaining to* ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

Advertisements.—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and those only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers, can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially either for money or in consideration of advertising patronage.*

The location on the indicator diagram of the points corresponding to the actual opening and closing of locomotive valves has always been attended with a good deal of uncertainty. This is probably accountable for the practice of determining the cut-off of valves for different positions of the reverse lever when the locomotive is at rest, and assuming that those relations hold under running conditions. However, about the first work on the locomotive testing plants showed that that method was wholly unreliable, as no account was taken of slack and springing in the valve gear. Recently some experiments have been made at Purdue University by taking indicator diagrams and valve ellipses simultaneously from a locomotive, and also from several types of stationary engines, and it is found that the different events of the stroke can be fairly well determined from the usual indicator diagram. A description of the methods used and results obtained in those trials are given by Mr. C. H. Robertson in this issue. Probably the most important conclusion to be drawn from the tests is that the complete closing of a locomotive valve is found on the indicator diagram at the point of contrary flexure, where the admission curve, convex upward, meets the curve of expansion, which is concave upward. This point Rankine, in his treatise on the steam engine, calls the "actual" cut-off in distinction from the point of intersection of the expansion curve produced and a horizontal line through the highest point at admission; this intersection he calls the "virtual or effective" cut-off. He further states that the latter point should be used to determine the effective ratio of expansion for efficiency computations, but as to this there seems to be considerable difference of opinion. The question was discussed at a meeting of the American Society of Mechanical Engineers about a year ago, but no definite conclusions were reached. However, the points on the indicator diagram corresponding to the actual openings and closings of the ports are the ones most frequently required and Mr. Robertson's work is timely in clearing up doubts as to their proper locations.

When a Governor appoints a bad railroad commissioner, or a legislature makes a law declaring what style of eight-penny nails shall be used in finishing freight cars, or a state commission insists on making the rates on second-hand ocean steamers, k. d., in 8-car lots, we thank God that things are not worse. For instance, we might have lived in Germany. But who would have thought that the Standard Code of Train Rules would ever get into a legislative body, and on this continent, too? Yet a press report from Montreal says :

> The question of running rules upon Canadian railways is one which has been forcing itself upon the attention of the Dominion Minister of Railways as the outcome of the contest still waging between the Grand Trunk and its employees as to the enforcement of the American rules. [A revision, on the lines of the code of the American Railway Association, made several months ago.] The difference has been one of such a practical nature that the Government feels called upon to provide a remedy of some sort, and such as may serve to obviate the recurrence of further trouble of this kind. To this end it is intended to introduce in the Dominion Parliament at this session legislation such as will place the matter even more directly within the Government control and provide for a uniform set of rules such as all railways may avail themselves of.

In the United States during the last dozen years the standard code has taken the place of the old unsystematic rules on scores of railroads, and no one has found it worth while to make any fuss; and we may be sure that some brotherhod agitator would have grieved if an excuse could have been found. But the appointment of a man from the United States to be General Manager of the Grand Trunk seems to have alarmed some employees; and the labor element, so-called, finds a ready ear in the Dominion Parliament. The objections to the new rules began to appear several months ago; and, if we remember correctly, one of the most serious was that brakemen were going to be compelled to ride on the tops of the cars; a detail of practice which, no doubt, will be continued practically the same as for the past forty years, as far as the comfort of the men is concerned. If the safety of trains demands that the brakemen ride in the caboose less than they have been doing, we cannot imagine that the new manager would wait till he could get out a book; he would issue a six-line order at once. The real grievance of the men is, no doubt, a general fear that they are going to be abused; which, being interpreted, generally means that there is a prospect that shirking and laziness will be made disagreeable. In reality the new code will not hurt the brakeman at all. Its worst effects will be on the legislator. We should like to have a seat in the gallery when Parliament comes to discuss Rule 99, Rule 20 (otherwise 320), the definition of "Train," and a few other humorous subjects that are to be found in the American code.

The Atbara Bridge.

The echoes of the Atbara bridge contract are gradually dying away, but they still continue to roll around the horizon. A late issue of "The Engineer" (London) contains drawings and a pretty good description of the bridge and an editorial article thereon, the latter being designed for admonition, reproof and warning to the universe. The editor acknowledges that "the American contracting firm have solved the problem in a very simple way." He proceeds then to mitigate the result by statements which he has, of course, made in good faith, but which are not entirely accurate.

He says, for example, that the erection was "rendered possible by substituting the well-known American pin girder for the riveted girder. . . . To this method of flying a river [cantilever] the pin girder is admirably suited. Indeed nothing better can be imagined. In this country the pin girder is not liked, and in point of fact it is by no means so rigid a structure as the riveted girder, and under continuous heavy traffic it has given trouble, the eyes at once stretching and cutting into the pins so that a very undesirable slackness and some amount of deflection has taken place. But we see no reason to doubt that the pin girder will answer every purpose over the Atbara, where traffic will be light, and give complete satisfaction."

But, actually, the riveted type of girder can also be erected by the cantilever method. The Forth bridge, for example, can still be seen in the British Islands and detailed descriptions of the method of erecting it can be found in the files of "The Engineer." For rapid erecting, of course, the pin connected type has great advantages.

It is a little misleading to say or imply that American pin connected bridges necessarily stretch in the eyes or develop cut or worn pins. The Crumlin viaduct and one or two badly designed structures in America have been used as examples of our practice, but every unprejudiced student has learned by this time the fundamental differences between good design and bad design of pin connected structures. During the last 10 years or more very many old pin connected bridges have been taken down because of the great increase in engine loads and train loads. These have been torn down and renewed under the observation of skillful engineers and bridge builders, men not only willing to learn, but anxious to learn; but we find no changes in the methods of proportioning pin bearings. One of the oldest long-span American bridges, the Steubenville bridge, built in 1864 and taken down in 1890, was particularly examined to find out the condition of the pins and pinholes. No elongated holes were discovered nor any worn or bent pins; but this bridge had been worked for a number of years much beyond the loads for which it was originally designed. In brief, every reputable American bridge builder would be willing to attach to each bridge the needle maker's guarantee, "warranted not to cut in the eye."

But notwithstanding the fear of the results of building pin connected bridges, "The Engineer" asks: "Why a pin bridge was not suggested in the first instance to English builders," and then proceeds to advocate the adoption of American bridge builders' methods by their English competitors. Over 100 years ago an American named Thomas Paine built and set up in London a complete bridge of five arch ribs of 110 ft. span "as a specimen for establishing a manufactory of bridges to be sent to all parts of the world," and he later petitioned Congress to erect a 400-ft. span "to remain exposed to public view that the need of such arches may be generally known." A word to the wise is sufficient. Paine is dead, but a number of Americans still live who are ready to set up American bridges in London or in any other part of the British Empire.

The Right to Route Your Freight.

The decision of the Supreme Court of Tennessee at its April term, in the suit of certain Memphis cotton shippers, to establish their right to route their goods, is one of the most interesting to railroad traffic officers that has been delivered by a high court for some time. The case is decided in favor of the railroad, although there was in force a through tariff, at the lowest rate, by the route which the shippers desired (and were refused); and incidentally the court expresses its approval, more or less qualified, of informal or unrecorded rate agreements, notwithstanding the existence of the anti-trust law. The refusal to compel the initial railroad to let the shipper select his own route is partly based on the fact that, as stated in the decision, there was some evidence that the shipper merely wanted to send the cotton over a line which would give him a secret rebate; but the main point is that as the initial road has the power to refuse through rates except over lines of its own choice, it may, on a moment's notice, or no notice at all, withdraw such through rates when they have been made.

The plaintiffs in this case are John A. Post & Co., and 10 other firms of cotton shippers. They made a test case against the Southern Railway, although all the eastbound roads at Memphis were interested. A small shipment of cotton was offered for Fall River, Mass., to be sent via Alexandria, Va., the Pennsylvania Railroad and the New York, New Haven & Hartford Railroad. The Southern had published a through tariff over this route, at the rate prevailing by all lines, 50½ cents per 100 lbs. The railroad refused to sign the bill of lading with the route inserted. In court the shippers claimed that the refusal was due to an agreement made by the Memphis roads, which divided the shipments from that city according to certain percentages; and this agreement was alleged to restrain trade and commerce. Until this case bills of lading with the shippers' preferred route had been signed without protest.

The defendant claimed that there was no equity in the bill, that the Sate Court had no jurisdiction and that the selection of the route was wholly within the railroad company's control; and the lower court decided against the railroad.

In the subsequent hearings the road said that it could take the freight through via Hagerstown, Md., or Pinner's Point, Va.; or it could take it to Alexandria at local rates. It was averred that the through rate, much less than the combined locals, could not be guaranteed for any length of time, and that the railroad could rightly select the route, for various reasons, to wit:

> Solvency of connection; ability to handle freight promptly; willingness and ability to settle claims growing out of shipments promptly; selection of lines with a view of having them return defendant's cars from the east loaded, or reciprocity in business relations; a particular line may at any time become disabled or congested so as to be unable to move freight promptly; defendant may be required to send its cars over lines which will not return them or pay mileage or return any business on them, while the line selected by defendant may do all this, and it should be left free to make its own selections.

The road denied that there was any agreement touching the routing of cotton, or that if there had been it violated any law, state or national; and denied that it had ever permitted shippers to route cotton. It was denied that the shipper had suffered loss or damage.

On appeal the road claimed that the lower court should have rejected evidence concerning the alleged agreement for the apportionment of cotton and should have compelled a certain witness to testify

as to whether or not his firm had received rebates from the Star Union Line on cotton shipped to the East. Finally, it was claimed that the Interstate Commerce Law did not compel railroads to issue through bills of lading and that the United States was the only party authorized to complain under the anti-trust law.

The decision of the Supreme Court of Tennessee, prepared by Judge Wilkes, deals first with the question of fact as to distribution of cotton shipped from Memphis. The minutes of the meeting of the railroads were put in evidence. From these it appears that at the meeting the Southern Railway Company "announced" the appointment of Frank Anderson as its agent at Memphis, who should announce rates on export cotton; that the road would furnish him, daily, the lowest ocean rates to foreign ports, that it would not make secret cuts, that it would not specify the routing of cotton in bills of lading, that it would distribute cotton among its connections with a view to maintaining rates through to destination, and that it would give 10 days notice of any change in its policy. The other roads made the same "announcement," naming the same agent. In a supplement to the proceedings of the conference it is stated that the representative of the Southern Railway "announced" that his road, for the ensuing year, would take only 13.42 per cent. of the cotton going out of Memphis; the representative of each of the six other roads "announced" in a similar manner; and the total of these percentages was exactly 100.00. After settling what this evidence was, the court decided that on a complaint like that made by the plaintiff the evidence should be admitted. Considering then the law, the court holds that what took place at the conference was not an actual contract capable of legal enforcement; it was a simultaneous declaration of "the same policy which had already been practiced" by each company. The court does not find that the complainants suffered any irreparable loss from a denial of their right to name the route of their cotton, and therefore proceeds to consider the legality of the concerted action and the effect that such action, if illegal, may be presumed to have on the interest of the shippers.

The court then goes on to quote the authorities (in which there was admittedly some conflict) in favor of the right of a railroad to select its connections. A railroad, in making a through contract beyond its own line, practically extends its own line, and though the carrier must treat all shippers alike, he may choose his own agencies and associates for doing his own business. (Supreme Court U. S. A.; A. T. & S. F. vs. D. & N. O., 110 U. S. 680.)

Quoting the case of St. Louis Dray Co. vs. L. & N. (65 Federal Reporter 41) it is declared that the initial carrier having the right to make through arrangements and to limit his liability beyond his own line, has the right at any moment to discontinue the through arrangements. If a carrier can refuse to make through arrangements certainly it can refuse to use them after being made, if for sufficient reasons it does not desire to use them. Concerning the reasons why a carrier may select its own connections the Court quotes, with approval, the testimony of Mr. J. M. Culp, Traffic Manager of the Southern Railway, who said:

> Satisfactory arrangements necessary to be made with all parts of the line for operation of through rates, including proportions to be allowed each carrier; the ability of the connecting lines to transport the traffic with the utmost speed; the solvency of different parts of the line; their willingness to and ability to promptly settle claims, either for loss to property, overcharge in rates, or loss of cars or other property of the company; reciprocity on the part of connecting lines in delivering freights to the defendants for transportation over its line in return for freights delivered to such connecting lines by it; participation in salaries and expenses of agencies established for procurement of traffic; compliance with the law, State and National, with respect to rates applying to traffic moved over such other lines; friendly co-operation of connecting lines and performance of duty so as to satisfy patrons and increase business; that it may not be compelled to send it cars over connecting lines which will not promptly return them; in order to select such connections as are able to furnish its proportion of cars needed by the through lines; that it may not be required to haul cars to Memphis empty to meet requirements of shippers in order to load their freight, while it may have a supply of empty cars on hand to be returned by other routes; so to distribute its tonnage as not to congest one or more of the roads, while forwarding so little traffic over other lines as to cause them to form other connections, to the disadvantage of the Southern Railway.

Mr. Culp further stated that sometimes, in order to fill a ship sailing from Brunswick, all cotton would be sent to that port; and then the next day perhaps all cotton would be sent to Norfolk; changes thus being constantly made to facilitate the prompt and efficient movement of freight.

The Court declares that a shipper preferring a particular route should give some reason therefor, especially when the carrier shows a situation like that described by Mr. Culp. In this case it was not shown that the shipper would receive any special benefit by having his own way. Witnesses refused to testify whether rebates were paid by the Star Union Line, but some evidence was given tending to show that rebates were paid, and the Court therefore says that plaintiffs do not come into court with clean hands. A mandatory injunction will not be granted except in extreme cases, and this is not such a case.

The Court goes on further to consider the fact that after the injunction against the railroads was issued by the lower court the shippers did not take advantage of their privilege of selecting their own route; and it did not appear that the Alexandria route was their favorite anyway. They seem to have selected this for the test case because they thought the Southern Railway could not make a very good defense.

Considering the agreement for division of cotton the court says:

> Now if it had been made to appear that in consequence and as a result of this declaration or agreements, rates had advanced or any injury had resulted or any shipper had been prejudiced or that such was the purpose of the declaration or its direct and inevitable result, it would have been clearly illegal, and an attempt to execute and enforce it could by a proper proceeding have been prevented, but if the declaration was simply an expression of a right which the carriers had without such declaration and not made for an illegal purpose and did not operate prejudicially to shippers, such declaration would not be unlawful nor would it furnish ground for injunction. It does not appear that in consequence of this declaration rates were advanced, but on the contrary it appears they were reduced and that too in the territory where the demand originated.

It was alleged that the next day after the agreement was made rates on export cotton were advanced 19 cents, but the Court does not believe that this was in consequence of the agreement; export rates fluctuate suddenly and violently. The Court is of the opinion that the agreement was not in violation of the Sherman anti-trust law. The United States Supreme Court had, indeed, sustained that law in two cases, but the opinion in each case was that of a bare majority of the Court, and

> while it is not our purpose in the slightest degree to question or criticise the holding of the majority we feel that we are justified in saying that it gives a forced effect and scope to the provisions of the act which cannot be reached by applying the general principles of the law, but must be sustained alone by the provisions of the act and an enforcement of them to the letter and in some cases contrary to the purpose and spirit of the act. As we understand these cases the difference between the majority and minority of the Court is that the majority hold the act to prohibit all contracts and combinations which shut out the operation of the freest and most unlimited competition, and the fact that competition of any kind and to any extent is restrained is conclusive of the question that the contract is in restraint of the trade; while the opinion of the minority holds that a contract or agreement is not in violation of the act unless its direct and immediate effect is to restrain trade and commerce. . . .

The Supreme Court is quoted further at considerable length and the decision then continues:

> We are of opinion that the declarations of the several roads in this case does not make them a combination or consolidated body bound together by a contract or legal agreement, but they can only be considered as a declaration by each road of its individual policy, and there is no stipulation to make a change in rates, but only to observe those already made under competition and for the purpose of preventing a practice which could not be for the general interest of shippers, but was only to subserve the secret purposes of a line extending cut rates to its customers, the effect of which would be to restrict commerce instead of to further and enlarge it. . . . That this declaration of policy by the several roads may hereafter be made the basis for illegal acts or practices is not sufficient ground for a present injunction unless such illegal act is its direct and necessary effect, and it must be borne in mind that the bill in this case is not framed to set aside the agreement as illegal, but is used as matter merely collateral to the main question.

The Court then goes on to show that only the United States District Attorney can bring a suit for injunction under the anti-trust law.

To traffic men and shippers the significant thing about this decision will be the sharp difference which it discloses as existing between court-made law and statute law in the matter of through tariffs. We do not know whether the cotton brokers are going to take their case to the United States Courts, or what legal technicalities may exist to prevent or nullify any efforts which they may be disposed to make in that direction; but it is easy to see that they will feel perfectly sure that, in the trials thus far had, justice has been denied them. If they did not come into court in this case with clean hands they can find no fault with the decision of Judge Wilkes; and in any event the Court is undoubtedly strong in its position that a suit at law for damages, rather than an application to a Court of Equity for an injunction is the proper remedy; but in the minds of disinterested outsiders the arguments of the Court will raise numerous queries as to whether law and justice are, in these dicta of the Court, fully in accord.

It is to be remembered all through the case that if the shipper had offered a higher price—the sum of the local rates over the several roads—he could have had his way in regard to routing; so that the real issue is whether he can enjoy both of two advantages; a low rate and a preferred route. But as both were offered him in a published tariff, what power, he will very naturally ask, can deprive him of them? According to the Interstate Commerce Law the rate by any given route cannot be advanced except on ten days' notice; how is it that the Court wholly ignores this feature of the case? To decide that a published rate may be abandoned—which in this case means an advance, if the shipper still desires to ship over the specified route—is virtually to decide that the ten-day provision of the law is null and void; which cannot have been the intention of the Court, for no mention is made of the point.

We are not arguing in behalf of shippers who desire to secure illegal rebates. If these complainants preferred the Pennsylvania because by that route they could get a secret advantage over those who shipped by other routes, they deserved to be defeated. But the principle at stake should be clearly set forth for the benefit of other shippers in future cases. Thousands of firms all over the country are every day sending out goods marked to go, in each case, by a specified route, and it is desirable to know whether the privilege of thus selecting the route is a mere childish indulgence, chiefly valuable because it humors shippers in their choice of soliciting agents' cigars, or is a business privilege which competition has so well established that the custom has virtually become a legal right. There is a widespread impression that between places which are connected by competing railroads the advance of a rate (or the withdrawal of a privilege, which amounts to the same thing) by one road will turn traffic to the second road so promptly that the first will quickly restore the rate or privilege previously enjoyed, unless for good grounds its granting can be shown to be unreasonable. We do not say that this freedom of competition should not be restricted; only that, if it is to be restricted, shippers have the right to know how the restricting process is going to be applied.

Judge Wilkes' treatment of the division-of-traffic agreement is of interest chiefly from the somewhat free criticism of the Supreme Court which it contains. He plainly sides with the minority of that Court in holding that a Congressional statute which is contrary to common sense deserves little respect from the Courts. If Judge Wilkes' view of this cotton agreement should be sustained by the Supreme Court of the United States it would tend to make evasion of the anti-trust law pretty easy. Every railroad traffic officer who reads this decision will say at once that the result of the cotton conference was an agreement. There was apparently no agreement in writing, with names signed to it, but the "announcements" of six roads would have had no effect whatever unless the seventh and last had also "announced" that it would accept a certain percentage; so that the seven announcements together amounted to a record of an unwritten agreement; that is, a confirmation of the negotiations, preceding the announcements, by which the percentages were so adjusted that they footed up exactly 100. If they had amounted to 110 there would have been no agreement; and the fact that the sum was brought down to 100 is what gave value to the conference. We have no objection to the principles of such an agreement, so long as no unreasonable advance in rates is produced; indeed, we have often advocated them; but if the anti-trust law is to be enforced against the railroads we should say that some Federal District Attorney had better keep his eye on the Supreme Court of Tennessee.

In deciding that the cotton agreement did not raise rates, Judge Wilkes gives evidence that he did not read Justice Peckham's famous decision with equal thoroughness throughout. To be sure, the agreement did not (probably) raise the rates; but who knows that it did not prevent them from going lower? The crowning glory of the anti-trust law is that it not only keeps rates down, but kicks them when they are down. Without an agreement the cotton-carrying roads might have gone on to much bloodier warfare than any that they had indulged in before, to the great (dis)advantage of the public.

The Financial Situation.

Wall Street has found its opportunity in the revived talk this week of the possible lease of the Boston & Albany by the New York Central to attract a wider public interest in the stock market, which for a long time past has suffered both in dragging prices and in dullness from the absence of any such stimulus. This is by no means the first time that it has been suggested that the New York Central was likely to gain control of the Boston & Albany, for such reports have been fairly persistent in the last year. Heretofore they have not received much attention, and the condition of the stock market probably has had most to do with the general acceptance of the belief that there is good foundation for the present report. So far there has been no official confirmation of the reported merges, nor has it been denied.

It is believed that the proposal to take over the road is to be acted on in New York this week, and already Wall Street has settled the terms. It assumes that the New York Central, adopting the plan used in the Lake Shore and Michigan Central merges, will offer the depositing stockholders of the Boston & Albany a three per cent. bond in exchange for the surrender of their shares, which for the purposes of exchange it is thought will be valued at $300 per share. This would be equivalent to the payment of a nine per cent. dividend on the Albany stock, which has been on a regular eight per cent. basis. Whatever basis there may be for the talk of consolidation, it has caused material advances in the quotations for the stocks.

The Boston & Albany has advanced to 280 from about 258 bid last week, and New York Central is up 10 points to 141. The movement in these stocks has brought about activity and higher prices in other so-called Vanderbilt shares. Thus Chicago Northwestern, in a few days, has advanced 10 points to 163, and Omaha even more to 110, the highest price in its history.

Wall Street, without waiting to test the truth of the report of the lease of the Boston & Albany or caring for its accuracy, for that matter, as long as its circulation aided its purposes, has used it to force a general upward movement, although this has been confined so far to so-called standard railroad shares. These have been the object of efforts to depress their market value by the professional speculators, who have expressed themselves fearful of widespread crop damage and other disasters which would affect tonnage and revenue. While the grain crops are by no means assured, it seems to be generally conceded that though the winter wheat harvest will be the poorest in years the outlook for corn and spring wheat is excellent. At any rate, large increases in railroad earnings have continued right along, and those for May and June, so far reported, are generally better than earlier in the year, although comparisons are with a period of large grain shipments. This better feeling has given an impetus to the rise in railroad share quotations, and St. Paul, which was selling a little while ago at 125, has advanced to 130, Rock Island from 107½ to 116, Burlington from 130½ to 134⅞, and other less active stocks have shared in this improvement. There has also been a better demand for bonds, but this market has not on the whole reflected either the depression or the dullness on the railroad shares in the past few months. For weeks as many as 20 and 30 different railroad bond issues have recorded the highest prices they have ever attained.

NEW PUBLICATIONS.

Patents and How to Make Money Out of Them. By W. B. Hutchinson and J. A. E. Criswell, members of the New York Bar. Small octavo, 232 pages, with index. New York: D. Van Nostrand Co., 1899. Price $1.25.

In the preface to this book the authors explain that the main object of it is to tell how to make money out of inventions and patents. They say that it is recognized that many men waste their ingenuity by exercising it in the wrong direction and that others fall into the hands of incompetent and unscrupulous attorneys. The hope of the authors is that by the study of this volume inventors may be helped to avoid both of these pitfalls.

The book is a useful elementary manual. It will tell the inventor (and what is quite as important, the man who may be tempted to buy a patent) something of the nature of patents and of their history, something concerning what is patentable and of the legal snags against which patentees are liable to run. Information is given concerning trade marks, copyrights and prints and labels, as well as concerning what we understand by patents. The third part of the book is of perhaps the most general interest, this being given to the commercial consideration of patents. Here we are told what to invent and how to invent it, how to introduce and sell inventions, how to organize and promote companies and something of the special uses of that modern creation, the promoter.

If those who feel called upon to invent should carefully study this book they would be saved much waste of energy and some grevious disappointment. The authors tell them that there is no occasion to go about inventions in a haphazard way, that there is hardly a public library of any size in America that does not contain drawings and claims of patents, at least since 1872. Nevertheless, it is the observation of these gentlemen that usually the inventor will go ahead without any attempt to see what has been accomplished in his line, and they have observed also that the inventor often fails to ask himself if there will be a demand for that which he produces. We have had experience with inventors and can confirm this. It has been our fortune to see the same things invented over and over again and each inventor comes forward with a serene ignorance of what anyone else has done before him. He creates in his mind a set of wants and conditions which do not exist and then starts in to fill them. It is probable that the little book now before us will keep a few people from making these particular mistakes, but after all it can only be a few people, for the great mass will have to learn by their own experience and suffering.

American Street Railway Investments. 1899 edition. Cloth, 13½x9½ in., 300 pages. Price, $5. New York: The Street Railway Publishing Co.

The 1899 edition of this annual financial supplement, better known as the "Red Book," contains financial statements of more than 1,400 of the street railroads of the United States and Canada. All reports are arranged in alphabetical order, according to the city where the headquarters of the company is located. The reports have been revised and brought down to June 1, and the publishers of the book state that nearly 90 per cent. of those in this issue are official. For several years past it has been noticed that new features have been introduced in this volume to make it of more value. This year we find the names of financial agents and of bankers and brokers handling the securities of the principal roads. It is a very useful book for bankers, brokers and capitalists interested in street railroad securities, as it contains the history of the organization of the companies, the financial description of securities issued, including dates of issue and of maturity, interest and dividends paid, trustees, etc. Four or five year comparisons can also be made of the operating receipts and expenses, fixed charges, surplus and dividends; also comparison for a number of years of assets and liabilities. This is a new feature. A description of plant and equipment, names of officers and directors is also to be had in the book. It also contains 34 fine maps, some of which are folding insets of the important electric railroad systems.

TRADE CATALOGUES.

Steel Tires and Steel Tired Wheels.—The Standard Steel Works, Harrison Building, Philadelphia, Pa., sends us a new catalogue showing something of its works and product. The plant of the company is at Burnham, Mifflin Co., Pa., and comprises an open hearth steel plant, a steel casting plant, a steel forging plant and machinery for the manufacture of locomotive tires and steel tired wheels. The annual capacity is 20,000 tires and 15,000 wheels. Lately the company has made some cast steel locomotive frames. The steel used by this concern in making tires under American specifications runs: Carbon, 0.65 to 0.75; phosphorus, under 0.05; silicon, under 0.25; manganese, 0.5 to 0.7; sulphur, under 0.05. The tensile strength runs from 110,000 to 125,000 lbs., the elastic limit from 55,000 to 65,000 lbs., and the elongation in two inches, 12 to 15 per cent. The pamphlet before us shows chemical and physical specifications not only for American practice but also English, Russian and Japanese, and for the Finland State Railroads. The wheels made by the Standard Works are wrought iron, spoke centers; forged, cast-steel centers with spokes; also steel and wrought iron palte centers of various types, as well as cast iron centers, spoke and plain.

Car Heating Apparatus.—The Safety Car Heating & Lighting Co., of 160 Broadway, New York; Monadnock Building, Chicago, and Union Trust Building, St. Louis, sends a new catalogue of car heating apparatus and fittings. The various systems of piping designed, made and installed by this company, together with numerous fittings, are illustrated by useful engravings and described with considerable completeness. The first system illustrated is what is called the standard heating system, designed for hot water circulation, with Baker heaters. This is shown with single or double circulation and with or without return pipes and as adapted to cars of various sizes. The direct steam system is then shown, also the regulating system and the locomotive equipment. A system of jackets, by means of which steam is applied to the water circulation, replacing the heat of a fire, is also shown in considerable detail, as are antihammering jackets, valves, cocks, couplers and all the various fittings necessary for complete installation.

A folder issued by the Shearer-Peters Paint Co., of Cincinnati, O., says that Pyro Paint is a coal tar product, from which the corroding and combustible elements of the tar have been removed. The patent was first issued to Mr. Shearer in 1891 and for six years he applied his paint to roofing and other cold surfaces. In 1898, C. Wilford Peters became associated with Mr. Shearer and the Shearer-Peters Paint Co. was formed. It is claimed that Pyro Paint is proof against sulphurous acid gases, steam, ammonia, etc. It is intended for use on either metal or woodwork, including smoke stacks, furnace fronts, locomotive front ends, etc.

Convention of Car Service Managers.

(*Continued from page 473*)

Association to the effect that each railroad should take the responsibility for the errors of its own employees, so that in case of an error in billing, say at Boston, which should result in the detention of a car at Chicago, the demurrage at Chicago would be paid by the Boston road. But it is hard to get this resolution carried out. It is impossible to eradicate the feeling that demurrage money has been easily earned and therefore should be easily refunded, and it is therefore the almost invariable practice for the Boston road (assuming a case such as we have just cited) to ask the Chicago road to have its car service manager refund the demurrage. The billing clerk is always represented as a deserving young man, working for a small salary and poorly situated to bear a loss.

Mr. Haskell's paper gave interesting details of his experience in settling these errors. In his territory, as elsewhere, general freight agents and other traffic officers manifest a constant tendency to overlook the fact that the collection of demurrage, which is largely a charge for trackage, should be treated from a business standpoint. The money thus earned belongs to the delivering railroad by legal right. Mr. Thomason's association, the Northeastern Pennsylvania, adopted a resolution in line with the policy set forth in his paper (to demand that the road making the error take the responsibility); and other associations were supposed to adopt the same resolution, but Mr. Haskell finds that only a small number have voted in favor of it, and some of these seem to have done so with a mental reservation, intending to enforce the rule only against roads outside that particular car service association.

A distinction should always be made between errors of bill clerks (and others) which cause delay in delivery, and those which do not cause delay. The latter are often used, but without the slightest justification, as a means of getting a demurrage bill refunded. Where a consignee is unable to identify his freight because the original car number has been omitted from the bill, he is generally considered to be innocent and not chargeable with any delay, but if the goods are billed directly to him he is, after all, bound to take them; the railroad is not bound to show the original car number. If the goods are billed to "order" the consignee may perhaps be less responsible, but if the railroad is willing to take the risk of delivering the goods he is bound to accept them or pay demurrage if he does not.

There is a general tendency to decide without sufficient reflection that even a legal demurrage charge should not be collected if it greatly annoys the consignee, and this loose practice continues to demoralize the service. When the collection of legal charges shall become the regular thing there will be a great improvement in the service. The public will not long resist and will bear no ill will against a road which merely enforces its rights. If the delivering road is firm in collecting just car service charges the consignee will soon find a way to get redress from the initial line, which, having issued the bill of lading, is responsible for the adjustment of reasonable claims.

It is necessary to be strict in your collections in order to prevent fraud. Mr. Haskell has on hand a number of claims for refunding on account of diversion wherein he discovered that the consignee himself had ordered the diversion. He also described a case wherein a car was detained at destination by errors in billing and the consignee claims from the railroad $18 demurrage under the rule of the Georgia Railroad Commission, imposing such a charge where a railroad fails to tender goods to the consignee within two days of arrival, and Mr. Haskell thinks this claim a just one, though he does not say whether or not it has been settled.

Officers for the ensuing year were elected as follows: President, J. D. Berry, Columbus, O.; Vice-President, J. C. Haskell, Atlanta, Ga.; Secretary-Treasurer, A. G. Thomason, Scranton, Pa. Atlantic City, N. J., is the place selected for the next annual meeting.

Train Dispatchers' Association Convention.

The twelfth annual convention of the Train Dispatchers' Association of America was held at Milwaukee, June 20, President H. B. Ware in the chair. The Rev. Geo. H. Ide opened the meeting with prayer and Mayor Rose of Milwaukee welcomed the convention in a brief address.

The report of the Executive Committee showed an increase in membership from 427 to 437, notwithstanding that 58 members had lapsed, 7 withdrawn and one had died during the year. Receipts for the year were reported at $1,860, leaving a small balance in the treasury; though there is still a debt.

The Train Rules Committee, in view of the pending revision of the Standard Code, for which it furnished suggestions last year, submitted no regular report,

but a summary by Mr. F. M. Benning, one of its members, of the various questions raised in the official organ during the year, was presented and briefly discussed. Mr. Wm. M. Goodwin, of the Grand Trunk, one of the instructors in Standard Code Rules for that road, submitted a number of questions regarding differences between the former and the revised Standard Code, which elicited considerable discussion, in which many members participated.

A paper on "The Chief Dispatcher," advocating the use of the chief dispatcher's signature to special orders, and that the chief dispatcher's office should be directly subordinate to that of the Superintendent without the trainmaster as an intermediary, was read by Mr. J. F. Mackie, and ordered printed in the official organ. A copy will be furnished to the chief operating official of every railroad in the country.

The following officers were elected for the ensuing year: President, F. N. Shultz (B. & O.), Garrett, Ind.; Vice-President, J. R. Lusk, (P. & W.), Mahoningtown, Pa. The Secretary, Treasurer and Editor, Mr. J. F. Mackie, holds over for another year.

The Milwaukee Dispatchers' Committee on Reception and Entertainment, G. A. Rossbach, Chairman, arranged a theatre party for Tuesday evening, a trolley party on Wednesday afternoon, and on Thursday a special train on the C., M. & St. P. to Kilbourne City, with a steamboat trip through the Dells of the Wisconsin and down the Wisconsin to Portage.

There were 60 members in attendance, and 19 new members were elected at the meeting.

The Railway Transportation Association.

This new association, which was noticed in the Railroad Gazette of April 21 and June 9, held its first regular meeting at New York City June 23, with President J. M. Daly in the chair. There were 21 members present and the membership of the Association now includes transportation and car service officers from more than half of the railroad mileage of the United States, and these roads own more than half the freight equipment of the country. The Association was permanently organized, with the following officers for the ensuing year: President, C. B. Adams, Superintendent of Transportation of the Wabash; Vice-President, Frank E. Higbie, Superintendent of Car Service, Central of New Jersey; Secretary and Treasurer, G. P. Conard, 24 Park Place, New York.

Reports were received from the Committee on General Transportation Topics and the Committees on Car Service and Tonnage Basis. The first mentioned committee discussed the need of a uniform system of transfer at junction points, and although it had not had time to formulate a plan the conclusion had been reached that some uniform plan should be agreed on. The Car Service Committee discussed the question, What constitutes delivery of a car to a connecting line? and held that a loaded car is delivered when placed on the connecting track in good order, if accompanied by or preceded by proper billing; an empty car is delivered when so placed in good order. Agents of both roads should exchange copies of their reports so as to adjust errors before sending them to headquarters. Where a delivery track is full of cars the committee believes that a car placed on another track near by should be considered as delivered, if the receiving road is advised. When, however, cars have to be held back some distance along the road from the delivering station a difficulty arises, as it does not seem practicable to treat a car as delivered before it reaches the junction point.

The Committee on Tonnage Basis has gathered information from 40 roads, 29 of which use tonnage basis; but practice is so variant that the committee could do nothing toward formulating uniform rules. The committee believes that the full actual mileage of freight engines should be recorded, including doubling hills and switching at local stations. The committee recommends that cars in local freight trains, from which freight is distributed, be recorded as carrying four tons.

The next meeting will be held at St. Louis January 17, 1900.

The Kinetic Motor.

Since my article on the Kinetic motor was published considerable experience has been had both in the design and construction of new forms of motors and in many features of interest and knowledge to be gained by their operation in actual passenger-carrying service.

Mechanically speaking, the chief result accomplished has been the successful completion of a double truck motor car 45 ft. long, with seats for 60 passengers. This car has motive power on one truck only, though there is no reason why there should not be power on both trucks, an arrangement that will be made when greater power is required, such as is necessary when several trailers are to be hauled. The latest development, in these double trucks, is to make each one somewhat in the form known to electric men as "maximum traction." This avoids the necessity of a side rod, so it is possible to run the wheels at a much higher number of revolutions, and thereby secure the desired speed without using large wheels. Having two trucks of this type both carrying motors nearly the entire weight of the car rests on the driving wheels, so that almost its full tractive value is secured without coupling any of the wheels.

Increased capacity has been gained chiefly in two ways. First by increased storage capacity. This is secured in the single truck cars by placing the longitudinal seats back to back, in the middle of the car, so that the storage reservoir may be placed partly above the car floor between the seats. Thorough jacketing prevents any heat entering the car, and the position of the seats gives the passenger a good outlook. In the double truck car the improved form of trucks gives more room between them for storage reservoirs hung on the car body. Improvements have been made in the condensers, giving greater radiating surface and lighter weight. While the idea of an air condenser seems in a way a new one, yet the world possesses more information on the subject than appears at the first glance; for the steam radiators used for warming buildings are nothing more or less than air condensers, though primarily intended to get the use of the heat contained in the steam rather than with a view of getting rid of it as an objectionable factor, as is the point to be gained in the condensers of the kinetic motor.

Another point, that has been developed, considers this motor in an altogether different light from the fireless locomotive, where the question of stored heat is paramount. The efforts to save heat by engineers are shown by the many kinds of feed water reheaters and economizers. The reduction of the amount of fuel burned under the boilers, due to heated feed water, is well established. As it is impracticable, on a locomotive, to use any system of feed water heating that would save waste heat, it is clear that the water must be heated economically before being taken aboard the engine, and kept hot on the tender before being fed to the boiler. The method of applying heat to generate steam on a locomotive is more wasteful of fuel than any other system of steam production known; therefore, regardless of any considerations of stored heat, the previous heating, in economical stationary boilers, of the water to be used on the locomotive, not only saves the waste of fuel inherent to the locomotive, but the necessity of carrying so much fuel on the engine is avoided. By previously heating the water to a temperature considerably above that at which the steam is taken from it, the only consumption of fuel necessary on the machine is that required to produce the latent heat of evaporation at the pressure of the steam used for power. The desirability of getting all the work, hence all the heat, possible out of the steam, before it reaches the condenser, suggests at once the advantage of the compound engine, which is now under consideration.

The operations of the Babylon Railroad during the summer of 1898 have developed several facts bearing on the cost of motive power, though the results obtained were not under the conditions of even reasonable economy. The motor running required recharging at intervals of eighty minutes. The stationary boiler was capable of heating the necessary amount of water in twenty minutes, so the amount of coal burned keeping the water hot during the intermediate times was practically wasted. Under these conditions, with two trailers, the motive power cost was one and one-half cents per car mile.

CHAS. J. BATES.

TECHNICAL.

Manufacturing and Business.

The Standard Coupler Co. has declared a semi-annual dividend of 4 per cent. on its preferred stock, payable July 1.

The Anaconda Brass Company, St. Louis, Mo., which recently purchased the brass foundry of J. W. Garrett & Co., has been combined with More-Jones & Co., of the same place. The new company will be known as the More-Jones Brass & Metal Company, and the business continued in the same way as before. The new officers are as follows: President and Treasurer, Edward A. Moore; General Manager, Henry T. Jones; Vice-President, Albert Waycott; and Secretary, John B. Stranch.

In connection with the statements brought out at the Master Mechanics' Convention regarding the durability of Moran flexible joints for steam pipes, a recent letter from the Republic Marble Co. of Knoxville, Tenn., is interesting. It is stated that Moran joints have been used continuously in the quarry for about 11 years, and are considered better than other forms of steam pipe connections tried.

Judge Allen, in the United States District Court at Springfield, Ill., has issued an order directing the Receiver for the Mt. Vernon Car Mfg. Co. to pay all labor claims contracted prior to the date on which the company went into the hands of the Receiver, May 18, 1897, and to buy a large lot of additional machinery.

The Cane Belt R. R., W. T. Eldridge, Vice-President and General Manager, Eagle Lake, Tex., is in the market for rails for 50 miles of road.

The Peoria & St. Louis, D. L. Wing, Contractor, 116 South Sixth street, Springfield, Ill., will require 5,700 tons of 65-lb. rails. (See Railroad Construction column.)

Benjamin Watson, 66 Beaver street, New York, dealer in new and second-hand rails, locomotives, cars and track supplies, has issued a small catalogue describing locomotives offered for sale by the Manhattan Elevated of New York City. These engines are standard gage and adapted to suburban, logging, plantation, contractors' and light railroad service.

Albert G. Wanier, Room 1006, 31 Nassau street, New York, wants to rent for a short term, with option to buy, a plant suitable for wood impregnating. A creosoting or chloride of zinc plant will answer the purpose.

Iron and Steel.

At a recent Directors' meeting of the American Steel & Wire Co. it was decided not to declare a dividend on the common stock. The resolution providing for one was tabled.

Press dispatches state that a company has been organized at Monterey, Mexico, with a capital of $10,000,000 gold, to build and operate steel works.

The Dominion Steel & Smelting Co. has been organized in Montreal with a capital of $20,000,000. According to the newspapers it is the intention to develop the iron and steel industries of Canada, more especially those of Nova Scotia and Cape Breton. The officers mentioned are: President, H. M. Whitney, of Boston; Vice-President, R. B. Angus, Montreal; Treasurer, James S. McLennan; and Secretary, B. F. Pearson, Halifax.

An order has been filed in the office of the Court of Chancery dismissing the bill of Walter R. Kern and other preferred stockholders of the Federal Steel Co. to restrain the payment of the first quarterly dividend on the common stock of the company. The order was made by Vice-Chancellor Gray at the motion of the counsel for Kern. The Vice-Chancellor also dismissed the temporary restraining order that had been issued against the payment of the dividend. It is stipulated in the order that the bill of complaint is dismissed and the temporary restraining order is set aside without prejudice.

New Stations and Shops.

Fire, on June 26, entirely destroyed the freight house of the Michigan Central in Toledo, O., and partly destroyed the freight house of the Cincinnati, Hamilton & Dayton and burned 100 loaded cars; a steam dredge was also destroyed. The Michigan Central freight house was a new building and was filled with out-going goods, as was also the warehouse of the Cincinnati, Hamilton & Dayton. The loss is stated to be over $300,000, a small part of which is covered by insurance.

It is stated that as soon as the necessary land can be got in readiness and the plans completed an addition 1,000 ft. long will be made to the present car works of the Canada Atlantic in Ottawa.

At the next meeting of the Hull City Council the finanace committee will recommend that $30,000 be voted to the Pontiac & Pacific Junction for the purpose of building docks and a depot in Hull when the line is extended from Aylmer to that city.

The Pearson King Bolt Clamp.

The Pearson king bolt clamp, illustrated herewith, was shown for the first time at the Old Point Comfort convention. This clamp is one of the most useful devices for a wrecking car and for shop and yard use. It does away with the old method of chaining trucks to body of car when derailed or when the brakes are to be lifted with the body of the car.

The Peerson King-Bolt Clamp.

It is equally applicable to both freight and passenger trucks and can readily be put in place by one man in a few seconds. It holds the truck in place to the body of the car when lifted and holds the truck springs in their proper position and also allows the trucks to be swung around when necessary.

Officers of the Master Mechanics' Association.

The following officers of the Master Mechanics' Association were elected to serve during the ensuing year: President, J. H. McConnell, Union Pacific; First Vice-President, W. S. Morris, Chesapeake & Ohio; Second Vice-President, A. M. Waitt, New York Cen-

tral & Hudson River; Third Vice-President, J. N. Barr, Chicago, Milwaukee & St. Paul; Treasurer, G. W. West, New York, Ontario & Western. The Executive Committee selected Mr. J. W. Taylor Secretary of the Association, to succeed Mr. Cloud.

The Sheffield Gasoline Motor Hand Cars.

The Sheffield Velocipede Car Co., Three Rivers, Mich., had a gasoline motor car on exhibition at the Old Point Comfort Conventions that attracted considerable attention. It was placed on the C. & O. tracks so that those who desired could test the riding qualities of the car. Thirty-six motor cars of the same type have recently been ordered by the Southern Pacific. One of the 250-lb. Sheffield gasoline cars was illustrated and described in our issue of July 24, 1896.

American Bridges for New Zealand.

The Berlin Iron Bridge Co., of East Berlin, Conn., according to report, received an order for an iron bridge from one of the County Councils in New Zealand.

Mr. Player and the Tandem Compound.

In the description of the tandem compound locomotives designed by Mr. Player for the Atchison, Topeka & Santa Fe, published in the Railroad Gazette June 16, no mention was made of the fact that this is simply a development of designs which Mr. Player has been working up to for the last 13 or 14 years. In 1886, when he was on the Iowa Central, he made drawings for changing an eight-wheel engine, simple, to a compound with tandem cylinders. Before the work could be carried out Mr. Player went to the Wisconsin Central, and there he prepared drawings for the application of tandem cylinders to compound a mogul, converting it into a ten-wheeler. He left his position on the Wisconsin Central almost before this change was made and gradually developed the idea to the point which it has now reached on the Atchison.

The Russian Rail Contract.

Within the last week the announcement has been widely published in the daily papers that the Carnegie Company has taken an enormous contract for rails to go to Russia. We are unable to get confirmation of this report, and not many particulars are given. The total order is given as 180,000 tons, which is said to be the largest contract ever made, and this is probably so. The price is said to be somewhere between $25 and $28 a ton, delivered at tidewater, and the delivery is to be spread over 26 months. Iron and steel men are inclined to think that the price is a low one even at $28, considering the present market, with billets at $31.50 per ton at Pittsburgh. It is proper to assume, however, that the astute gentlemen who have managed this matter know what they are about. An order sufficient to keep their rail mills running for five or six months, and which can be spread over two years, is in itself so valuable that it may well have been taken considerably below domestic prices. Furthermore, the contract would have to be taken in competition with continental mills.

THE SCRAP HEAP.

Notes.

The Delaware & Hudson is to put oil on 10 miles of its roadbed between Albany and Saratoga.

The Manhattan Ry. Co., New York, is said to have bought the necessary site for a power-house on the East River, between 74th and 75th Sts. A contract has been let with the Lackawanna Steel Company for 9,000 tons of 100-lb. rails to be used as third rail.

The Baltimore & Ohio is sprinkling its roadbed in a number of places with oil for the purpose of reducing the dust nuisance; but the cute and enterprising press agent takes care to inform the public that the B. & O. does not need to use a great deal of oil, because its tracks are so largety ballasted with broken stone. Companies whose roads are made up chiefly of dust may therefore take comfort in the knowledge that the oil market will not be cornered.

The Maine Central is having 25 passenger cars fitted with pressure-retaining valves. These cars run on the White Mountain Division. It is intended to use one-half the retaining valves on a train while going down steep grades, taking care to use all of the valves alternately.

The official time-table of the Canadian Pacific shows that the Imperial Limited, the through daily transcontinental passenger train, runs from Montreal to Vancouver, 2,906 miles, in 102 hours, 45 minutes actual time, 99 hours, 45 minutes apparent time; and on the eastbound trip the train takes 103 hours 10 minutes actual time, or 106 hours, 10 minutes apparent time.

The track of the Southern Pacific in Western Texas was severely damaged by rainstorms and floods last week. A press dispatch says that 28 miles of the line was severely damaged, and that a number of bridges will have to be rebuilt.

A press dispatch from Albany states that the canal from Honesdale, Pa., to Kingston, N. Y., now practically abandoned for through traffic, has been sold by the Delaware & Hudson Canal Company to S. P. Coykendall, of Kingston, who owns cement works on the line of the canal about 10 miles from the Hudson River.

The train leaving New York for Chicago over the New York Central at 1 P. M. has been made faster, and now reaches Chicago at 2:30 P. M. (26½ hours). The fast mail train leaving Chicago at 8:30 A. M. now arrives in New York the next day at 10 A. M. (24½ hours). A new westbound train has been put on, leaving New York at 4 P. M., called the Detroit Special. This train is to relieve the Chicago Limited, starting at 5:30 P. M. The new fast train between New York and Saratoga over the New York Central and the Delaware & Hudson roads began running on Saturday last. This train runs through, 180 miles, in 3½ hours, going down in the morning and up in the afternoon. On Saturdays the northbound train leaves New York at 1:50 P. M. instead of 3:30, which is the time on other days.

The American Isthmus Ship Canal Co.

This is the name of a corporation which filed articles at Trenton, N. J., June 26, signifying its intention to acquire any and all desirable canals or concessions from the Atlantic to the Pacific Ocean. The capital is $30,000, with power to increase to $250,000,000. The incorporators are Henry Leeds and Wm. C. Merriam, of New York, and Juan A. Smith, of Jersey City, and the office is in Jersey City. Representatives of the corporation refuse to say much about its purposes, but it is reported that one of the principal capitalists interested in it is ex-Mayor William R. Grace, of New York.

The Southern Passenger Station at Greensboro.

The Southern Railway Company has just completed and occupied a new passenger station at Greensboro, N. C., that is said to be the finest on its system. The building is 44x157 ft., with a ten foot overhang all around, and a 30x38-ft. L for baggage room. The exterior walls are of pressed brick in red mortar, with brown sandstone trimmings, the roof of slate and the gutters and leaders are of copper. The basement is arranged for a steam heating plant and electric light outfit, used in lighting the buildings of the Company and the adjoining yards. The first floor is devoted to waiting rooms, lunch counter, mail room, baggage and express. The general waiting room is 40x85, with two retiring rooms, ticket office, closets, etc. The interior walls are of light yellow enameled and buff brick, with large terra cotta mantels and heavy panelled oak ceilings. The floor is Terrazzo, with slate base. The second floor is divided into 18 offices, all finished in oak, with large plate glass windows, adamant cement plaster walls, and all conveniences. The attic is large, and is to be used for the storage of records, etc. The contractors were D. Getaz & Co., Knoxville, Tenn., and the engineer in charge was Benj. Thompson.

Railroads and Projected Railroads in Switzerland.

No. 455 of the Consular Reports, issued by the State Department, contains a list of the railroads of Switzerland, together with a list of the concessions for railroads which have been granted by the Government and are now in force, the whole being a report made by Consul A. L. Frankenthal, of Berne. The length of railroad in Switzerland is 2,490 miles, divided as follows: main lines, 1,943; narrow gage, 390; cogwheel lines, 56.5; cable lines, 11.8; street car lines, 88.9. The list shows the kind of motive power used on each of the 108 lines. The list of projected lines includes 120 companies with a projected length of 1,263 miles. On many of these it is planned to use electric motors. The names of the holders of the concessions are given, and where a line is in process of construction the fact is indicated in the list.

It is said that this information has been gathered in response to a request made by American manufacturers and contractors. The procedure necessary to obtain a railroad concession in Switzerland is set forth in some detail, and appears to be quite easy to carry out. The Consul believes that many concessions have been secured for speculative purposes. Concessions are granted for 80 years and no deposit is required. The conditions under which the Government reserves the right to buy any railroad, after 1915, are briefly stated. The attitude of the Government toward railroad building is very favorable.

Caillet's Monorail.

The Monorail Portable Railway Company of England is now introducing a single rail track for the transportation of freight, which is claimed to be so good and so cheap that it has already found favor with the Egyptian Government and in other places where freight transportation must be provided for at very low cost. A line 66 miles long is now being built at Carsevene, French Guiana.

This railroad, made under the Caillett patents, consists of a single light rail, supported by steel sole plates at intervals of a few feet, laid directly on the ground, without sleepers; and generally, it is said, without ballasting or grading. The cars are simply large wheelbarrows, with a wheel at the rear as well as at the front, and each one is propelled and guided by a workman, who grasps a handle extending to one side. By employing animals to draw the cars, loads of four tons can be carried. It is said that cars run on this kind of railroad show a saving of over 80 per cent. as compared with wheelbarrow transportation. The estimated cost of a road is given as $1,250 a mile, including cars. The company has an exhibit at the Royal Agricultural Society's show at Maidstone.

Electric Roads in Marseilles.

Mr. Robert P. Skinner, Consul at Marseilles, sends under date of May 2 some particulars regarding the present work of improving the street car service in Marseilles. Up to the present time, Marseilles has had an inadequate service, but under the new plans the horse cars will be taken off and the Dickinson overhead trolley will be used on the line. The company making the improvements is obliged to replace in perfect order and to pave when necessary the surface of the streets disturbed between tracks and an additional strip of 14 inches along each outside rail. The fares vary from two to eight cents, but when the electric lines are completed the uniform fare of two cents only will be charged. The company will pay an annual fee of $19,300 for the use of the streets, and when the gross receipts for a year aggregate $1,400,000 supplementary fees will be charged. Electric trains composed of not more than four cars will be used. Upon the expiration of the concession, i. e., in 1950, the State will become the owner of the tracks and appurtenances, and should the State deem it useless to continue the working of any of the lines the company will be required to remove tracks and restore the streets to their original condition.

Chicago Elevated Railways.

The elevated railroad system of Chicago will not be complete until the Northwestern Elevated is finished next winter. It will then have 92 miles of single track. The South Side Elevated already has a convenient connection, by means of elevators, with the Calumet Electric, covering the whole South Side below Sixth-third St.; the Metropolitan gets the business from the Suburban Railroad, reaching out to La Grange on the Southwest; the Lake Street Elevated operates its trains to the west edge of Austin over the Chicago & Cicero; the Northwestern will either lease the Evanston Branch of the Chicago, Milwaukee & St. Paul or make a closer connection by means of an incline. Thus the elevated system will be fed from the whole suburban belt surrounding the city, and even closer traffic connections will probably be made next year. It is highly probable that within a year a plan will be evolved for consolidating this system.—Chicago Economist.

Chicago Notes.

The contract for the "Robert A. Waller Municipal Lighting Station" has been let to E. W. Sproul for $12,409. Work will be begun at once. The plant will have a capacity of 1,200 lights and will supply the district south of Forty-third St., which is at present supplied by private companies.

The Board of Local Improvements last week let contracts for pavements on parts of 15 streets, amounting to about $300,000. Some of the pavements are to be brick, at $1.85 a sq. yd., some of asphalt at $2.03 a sq. yd., and some of macadam.

The State Board of Health of Illinois will make a study of the effect upon the waters of the Illinois River due to the opening of the Drainage Canal.

In the Chicago City Council on June 19, an ordinance was introduced and referred to the Finance Committee which provides for a city department on street railway transportation, similar to the track elevation department and providing for a Commissioner at $5,000 a year and a Secretary at $2,000.

The ordinance providing for a committee of the council to study the street railway question in this country and Europe will probably not be passed.

An ordinance was also introduced and referred to committee providing that all wagons carrying over 6,500 lbs. shall have tires at least 4½ in. wide, and that one horse shall not be made to haul more than 3,000 lbs., two horses more than 6,500 lbs. and that an additional horse or mule shall be provided for every additional 3,000 lbs. above 6,500 lbs.

The Chicago City Ry. was given a permit to use the overhead trolley for 90 days on State St. from Root St. to Van Buren St. and thence around the down-town cable loop, and from Twenty-second St. north on Wabash Ave. This permit was granted on recommendation of the City Engineer to enable the company to make extensive and much needed repairs to its Twentieth St. power plant which has been in operation since 1882. Two new engines and new driving machines for the cable will be installed. The company enters into an agreement not to keep the trolley wires and poles up after the 90 days, and not to resist their being taken down at the expiration of the time. Electric current for the trolley cars will be supplied from two of the company's plants which have sufficient capacity and new cars will be used.

Lake Notes.

Summer passenger traffic has begun on Lake Michigan. On June 22 the steamer Manitou of the Lake Michigan & Lake Superior Line, left Chicago on her first trip to Mackinac with 300 passengers.

The steamer Shenandoah arrived at South Chicago on Saturday, June 17, at 3 P. M. with 3,300 tons of ore. At 4 P. M. on Sunday, June 18, she sailed, carrying 161,000 bu. of oats, a fine record for rapid handling of cargo.

Bids for the inshore section of the new breakwater at South Chicago were opened June 22 by Major W. L. Marshall, and contract was awarded to the Hausler & Lutz Co. of South Chicago, at about $500,000. The breakwater will be 3,700 ft. long and will extend in a northeasterly direction into the Lake. Work must be completed by Dec. 1, 1901. The construction will be of wooden cribs resting on a stone foundation, the cribs to be 24 ft. wide near the shore and 30 ft. wide at the outer end.

Electric Railroad Notes.

The Niagara Falls & Lewiston RR. Co., the all American Line, running between Niagara Falls and Lewiston, N. Y., in the gorge of the Niagara River, has been reorganized through the sale of the property last February by the Receiver under a decree of the Supreme Court, to Herbert P. Bissell and others. The new company, though still subject to the original mortgage, is called the Niagara Gorge Railroad Company or "The Great Gorge Route." Its officers are: President, Gen. Francis V. Greene, 11 Broadway, New York; Vice-President, Herbert P. Bissell; Secretary, Herbert H. Hewitt; and Treasurer, Bert L. Jones, all of Ellicott Square, Buffalo, N. Y. Godfrey Morgan is General Manager, with office at Niagara Falls. The amount of the capital stock is $1,000,000, and the bonded indebtedness $1,000,000. The mileage of the road is seven miles, all double track. The company also owns a good deal of real estate at Niagara Falls and elsewhere along its line. A large amount of money has just been spent in putting the road in thorough repair and constructing permanent improvements, it having suffered considerable by landslides during last winter. The road was to be opened under the new management on June 27.

The Roanoke (Va.) Street Ry. will be sold at auction Aug. 1, under foreclosure of a mortgage issued in 1892. The upset price is said to be $50,000. It is an electric railroad 20 moles long, operating, at last report, 12 cars.

The Massachusetts Electric Companies, which has taken over 33 of the electric railroads in Eastern Massachusetts as far north from Boston as Nashua, N. H., and Newburyport and Gloucester, Mass., and south as far as Fall River, Mass., and Providence and Newport, R. I., and the various electric light companies doing business in the same section, offered for subscription last week $12,000,000 of its 4% cumulative shares, and $12,000,000 of its common shares. The total length of the street railroads of this company is 647.41 miles of track. The company will operate 1,426 cars, of which 618 are closed and 808 open. There are 18 power-houses having a total rated capacity of 28,483 h.p.

The Mankato (Minn.) Electric St. Ry., Lighting & Power Co., which was incorporated last April, is

said to have purchased the plant of the American Linseed Oil Co., and will use it as the location of its new power-house. S. Wilhartz is Secretary and Manager.

The Kings County and Fulton Elevated Railroad companies will be sold at auction July 6, in foreclosure proceedings brought by the Mercantile and Central Trust companies. No bid less than $1,750,000 will be received.

A special meeting of the stockholders of the Third Avenue Railroad Company, New York, has been called for July 19 to consider an increase of the capital stock of the company from $12,000,000 to $40,000,000. Fifteen million of the $28,000,000 new stock, it is estimated, will be used to paying the cost of the improvements in progress and in contemplation, and to extinguish the floating debt.

Technical Schools.

Armour Institute of Technology-Commencement exercises of the technical college were held June 21, and 32 students received degrees, 9 in mechanical engineering, 20 in electrical engineering and 3 in architecture. Prof. Edmund J. James, of the University of Chicago, delivered the annual address, his subject being "The Function of Technical Training ing in a National System of Education."

University of Wisconsin.—The 46th Annual Commencement was held at Madison, Wis., June 22, 281 students receiving diplomas, of whom 25 took advanced degrees. The Science Club medal for the best thesis on a scientific subject was awarded to Mr. Carl Hamburchen, of Milwaukee, his subject being "The Corrosion of Iron Under Certain Conditions."

University of Michigan.—The 55th Annual Commencement took place June 22 and 697 degrees were conferred. The address was delivered by Dr. Nicholas Murray Butler, of Columbia University, on "The Education of Public Opinion."

Purdue University.—An announcement of the following 30 courses in Railway Engineering and Railway Management for 1899-1900 has been issued by the University: Railway Economics; Railway Surveying; Railway Construction; Track Maintenance; Tests of Track Materials; Tests of Track; Block and Interlocking Signaling; Water Supply Stations; Design and Operation of Terminals; Railway Chemistry; Railway Sanitation; Locomotive Design; Locomotive Testing; Locomotive Performance; Locomotive Operation and Maintenance; Tests of Locomotive Injectors; Car Construction; Tests of Car Materials; Train Brakes and Signals; Tests of Air-Brake Materials; Car Lighting, Heating and Ventilation; Tests of Lighting Equipment; Car Sanitation; Interchange of Cars; Tests of Atmospheric Resistance; Train Rating; Electric Railways; Tests of Electric Equipment; Steam vs. Electric Traction; Visits of Inspection. All of these courses are open to graduate students. A description of the equipment of the department and the requirements for admission are also given in the circular, together with a list of special lectures, which was published in our issue of April 26.

LOCOMOTIVE BUILDING.

The Cane Belt wants two light locomotives.

It is again stated that the Washington County will order two engines, one pasenger and one shifting engine.

The Minneapolis & St. Louis has placed an order with the Baldwin Locomotive Works for two engines.

The Lake Shore & Michigan Southern has ordered 11 10-wheel passenger engines from the Brooks Locomotive Works.

We are advised by the Rogers Locomotive Co. that it has not received an order for 25 mogul engines for a railroad in Chili, as has been reported.

Last week we noted a rumor to the effect that the Canadian Pacific had placed an order with the Canadian Locomotive & Engine Co. for six compound engines. This rumor is now confirmed.

The Chicago & Northwestern has placed an order with the Schenectady Locomotive Works for 32 locomotives; 12 are for September, 10 for October, and 10 for November delivery.

The H. K. Porter Co. has received an order for one four-wheel locomotive for the French, Rand Gold Mining Co., Ltd., to be shipped to Johannesburg, South Africa. It will have 6 in. x 10 in. cylinders, driving wheels 23 in. in diam., gage 18 in. and a weight in working order of 6½ tons.

The H. K. Porter Co. has received an order for one four-wheel eight-ton 7 in. x 12 in. cylinder locomotive for Japan. It is for a 30 in. gage road and will have 24 in. driving wheels. A sheet steel canopy will be used instead of a cab.

The Cleveland Cotton Mills at Lawndale, N. C., have ordered one Forney type 36 in. gage locomotive from the H. K. Porter Co. It will have 10 in. x 14 in. cylinders, 36 in. driving wheels, 20 in. truck wheels, and will weigh 25,500 lbs. on drivers, with a total weight in working order of 38,000 lbs.

The H. K. Porter Co. has received orders for two compressed air locomotives of the same dimensions, one each for the Anaconda Gold Mining Co., Colorado, and the Gold Exploration & Tunnel Co., Colorado. These will have four 23 in. driving wheels, 5 in. x 10 in. cylinders, a clear height of 5 ft., and will weigh in working order 9,500 lbs. and carry an air pressure in the storage tanks of 750 lbs. per square inch; they will be for 18 in. gage.

CAR BUILDING.

The Intercolonial has ordered 20 refrigerator cars from Rhodes, Curry & Co.

Rhodes, Curry & Co., have received an order from the Midland for 20 flat cars.

The Wheeling & Lake Erie has received bids on 900 freight cars of different kinds.

The Cane Belt wants, for immediate use, two combination passenger and baggage cars.

The Texas Central is having one baggage and mail car built by the Harlan & Hollingsworth Co.

Pullman's Palace Car Co. has an order for four sleeping cars for the Midland Ry. of England.

An order has been placed by the Dominion Coal Co. for 20 30-ton cars with Rhodes, Curry & Co.

The Harlan & Hollingsworth Co. is building one passenger car and one sleeping car for the Great Falls & Canada.

The St. Louis Southwestern box cars have not yet been let, but it is reported that the number will be increased.

It is stated that the Pennsylvania Company has given orders to build 350 new freight cars at its Fort Wayne shops.

One baggage and mail car is being built at the works of the Harlan & Hollingsworth Co. for the Cumberland & Pennsylvania.

The Illinois Central is getting bids from several car builders on 1,000 40-ton box cars, but the contract will probably not be let for several days.

The Louisville, Evansville & St. Louis has ordered from the Pullman's Palace Car Co. the 500 coal cars mentioned in our issue of last week.

We are reliably informed that the Baltimore & Ohio Southwestern has ordered 50 furniture cars 50 ft. long from the American Car & Foundry Co.

The Mexican Central has placed an order with the Barney & Smith Car Co. for 16 passenger cars, eight of which will be first-class and eight third-class.

We are reliably informed that the Delaware & Hudson has ordered 250 twin hopper 40-ton coal cars from the American Car & Foundry Co., to be built at St. Louis.

We are officially informed that there is no truth in the newspaper report that Pullman's Palace Car Co. has received a large order, or in fact, any order for cars for use in the Argentine Republic.

The number of passenger cars now being built for the Seaboard Air Line by the Harlan & Hollingsworth Co. is 18; 10 of these are first-class vestibuled cars, three second-class vestibuled cars, three vestibuled baggage and express cars, and two vestibuled postal cars.

The 100 box cars which Pullman's Palace Car Co. is building for the Houston East & West Texas, as noted in our recent issues, are for August delivery. They will be of 60,000 lbs. capacity, 40 ft. long, 9 ft. wide, 7 ft. 6 in. high in doorway, and will weigh about 35,000 lbs. The special equipment will include Westinghouse air brakes, wooden brake beams, steel axles, American Steel Foundry Co.'s trucks, steel bolsters and end castings, and Missouri Pacific No. 2 couplers made by the American Steel Foundry Co., French springs, Murphy inside roofs, Hewitt cast-iron journal boxes and lids, St. Louis flush doors, American continuous draft rigging, lead-lined brasses, cast-iron brake shoes, Patterson Sargent Co.'s paint and Griffin chilled cast-iron 33-in. wheels.

The Boston Elevated has prepared specifications for new closed cars; about 100 or 150 will be ordered soon.

BRIDGE BUILDING.

AARON, WIS.—There will be a bridge built in this town some time during the coming summer of about 100 ft. span, probably of steel. Address Town Clerk of Rusk, Wis.

ALEDO, ILL.—We are informed that the Commissioners of Ohio Grove, Mercer County, expect to ask the county for aid to build three small iron bridges. Address Moses McIntire, Devona, Ill. Wm. B. Frew, County Surveyor, Aledo.

ALLIANCE, O.—It is reported that representatives of the Pennsylvania Company are considering plans with the City Council for bridges and gates at the various railroad crossings in the city. It has been decided to build another overhead bridge, the railroad company to pay for the bridge work and the County Commissioners for the abutments. No location has been decided upon for the bridge.

ASBURY PARK, N. J.—The Board of Trade are considering plans for the use of an appropriation of $18,000 for a bridge over Sunset Lake, at Grand Ave., in Keyport. The Board of Freeholders have let contracts for the new iron bridge near Turkey, the abutments to H. B. Pitcher & Co., for $1,500, and the superstructure to the Wrought Iron Bridge Co.

ATLANTIC CITY, N. J.—The Bridge Committee of the County Board of Freeholders have awarded the contract to the Phoenix Bridge Co. for the iron bridge over Mullica River, between Nesco and Elwood. (June 16, p. 436.)

BERLIN, ONT.—The contract for the steel superstructure of the highway bridge at Wallenstein, Ontario, was let, June 20, to the Hamilton Bridge Works Co. for $1,700, and stone piers to Rowan & Elliott at $7.15 per cu. yd. (June 16, p. 436.)

BEMENT, ILL.—At the Town Hall, July 8, contracts will be let for a 75x16 ft. steel highway bridge on 116 cu. yds. of squared stone masonry. Certified check for $100 to accompany all bids. Plans and specifications on file with Harvey Fay, Town Clerk.

BINGHAMTON, N. Y.—The State Railroad Commissioners will meet in Binghamton to consider abolishing the grade crossing at Chenango St.

BLACKWELL, OKLA.—The Blackwell & Southern will need one bridge on the new line. See Railroad Construction Column.

BLOUNTSTOWN, FLA.—An iron bridge across the Chipola River, Calhoun County, we are informed, needs repairing, and contracts will probably be let for the work. Address J. H. Davis, County Surveyor.

BOSTON, MASS.—City Engineer Jackson has submitted plans for rebuilding the Malden bridge in Charlestown. His plan calls for a wooden bridge 60 ft. wide, replacing the present bridge, and with a draw 40 ft. wide, worked by electricity. He also submitted plans for the new Cove St. bridge, to be 50 ft. wide, built of steel on stone piers. A meeting will be held July 19.

BOULDER, MONT.—The Clerk of Jefferson County will receive bids for a 100-ft. span steel bridge on cylinder piers, with 16-ft. roadway, to be built across the Boulder River at Boulder. Bids to be received to July 17, at noon.

Bids are also wanted for one 76-ft. span, wood or steel bridge across the Boulder River at Dudley's Crossing, bidders to furnish plans, etc. Bids to be received same date. W. M. Fergus, County Clerk.

BOYERSTOWN, PA.—We are informed that the present wooden trestle at Reading Ave. on the Philadelphia & Reading will be replaced with an iron pony truss bridge having a clear span of 65 ft. and total length 71 ft. (June 23, p. 459.)

BRECKENRIDGE, COL.—County Commissioner Forslund reports that seven bridges have been washed away by recent high waters.

BROWNSVILLE, TEX.—We are informed that several bridges are required by Cameron County, but the chances are vague for building in the near future.

BRUSHY FORK, ILL.—We are informed that an iron bridge about 100 ft. long will be built over Brushy Fork River by the Commissioners of Sargent Township and Douglas County. The work is estimated to cost $3,000.

BUCKSPORT, ME.—At a recent meeting of the Town Council it was decided to repair the old bridge on Main St., and not to build a new one, as at first proposed.

CALIFORNIA, KY.—Seven bids were submitted June 5 to E. E. Ball, County Engineer, for the iron spans over Ten-Mile and Phillips Creeks. Five other bridges are now in consideration. (June 2, p. 391.)

CANYON, TEX.—Morgan Rhodes has the contract for the steel bridge across Tiera Blanca Creek from Randall County.

CATAHOULA PARISH, LA.—The President of Police Jury will receive bids July 1 for a steel bridge about 250 ft. long, to be built over Bushy Creek, at an estimated cost of $5,000.

CENTRAL FALLS, R. I.—See Pawtucket, R. I., below.

CHARLOTTE, N. C.—According to report, an iron bridge will be built by the Southern Ry. on Graham St. to replace the present wooden structure. S. S. McMirch, Chairman Street Committee.

CHARLOTTETOWN, P. E. I.—A steel bridge of 100 ft. span will be erected at Victoria, according to report.

CHATHAM, ONT.—The County Council, according to report, has instructed W. W. McGeorge to prepare plans for a new bridge over Faucher Creek.

CLAIRMONT, TEX.—Kent County, we are informed, will build a new bridge in place of the one recently destroyed, on Snyder road, near Double Mt., and which cost $11,000. The bridge will be about 250 ft. between abutments, with approaches of 100 ft. each.

COATESVILLE, PA.—The Borough Council will receive bids July 1 for the stone and brick arch bridge over a creek in Coatesville.

COHOES, N. Y.—It is said the Rochester Bridge Co. has secured the contract for the bridge over the Mohawk River for $20,700. Other bids received were: Berlin Bridge Co., $22,091; Hilton Bridge Co., $25,200; King Bridge Co., $26,970; Croton Bridge & Manufacturing Co., $21,849; Edgemore Bridge Co., $30,200; Youngstown Bridge Co., $23,400; Wrought Iron Bridge Co., $23,900; Rochester Bridge Co., $20,700. (April 28, p. 303.)

CORDOVA, MEXICO.—Proposals are asked until Aug. 31 by the General Superintendent of the Vera Cruz & Pacific RR. on steel bridge and pile and timber trestle work, as mentioned in our advertising columns.

COVINGTON, KY.—Bids will be received by M. T. Shine, County Judge, in Covington, for the construction of a new steel bridge over Bank Lick Creek, at Bristow's Crossing, in Kenton County, one span 68 ft. on pin centers, 12 ft. roadway, steel joists, floor 2½ in., capacity 125 lbs. per sq. ft. W. T. Loomis, Staffordsburg, Ky.; L. L. Manson, Milldale, Ky., Committee.

CULLOM, ILL.—The towns of Sullivan and Charlotte will build a steel bridge about 250 ft. long over the Vermilion River. It will probably be of three low-arch spans on steel tubes, and the substructure and superstructure will probably be let in one contract. The work is estimated to cost between $2,500 and $3,000. Address the Town Clerk of Cullom, Ill.

DECATUR, ILL.—Plans are being considered for repairing the Wykoff bridge in Decatur Township. Plans are also under consideration for a new bridge at Mosquito Creek, two miles north of Blue Mound, Macon County.

ELLENSBURG, WASH.—E. L. Evans, County Clerk, informs us that bids are wanted by July 6 for a combination or Howe truss highway bridge across Wakima River, about 1¾ miles from Ellensburg. The proposed bridge is to consist of one span 160 ft. At the north end of the bridge a trestle approach of 100 ft., with a grade of 5 per cent. will also be built. Estimates must include the cost of removing the old structure. (April 28, p. 303.)

FAYETTE, ALA.—The Jasper (Ala.) Construction Co. will build two iron bridges for Fayette County, one at Ford's Bridge, on the Sipsey River, and the other across North River at Olive's Mill. F. M. Dobson, manager of the company, will have charge of the work.

FLORENCE, ALA.—The Commissioners of Lauderdale County have let a contract to the Converse Bridge Co. of Chattanooga, Tenn., for a steel bridge across Little Cypress Creek, near Florence, the price being $3,000, with time limit to Nov. 15.

FOWLER, IND.—Bids are wanted, according to report, July 5, for five county bridges, all steel structures. Address J. A. Blaisdell County Surveyor.

FRANKFORT, IND.—All the bids received by the County Commissioners June 19 for the bridges mentioned in this column June 16, p. 437, were rejected, according to report, as not being on proper blanks. The bidders, according to the report, were W. R. Hines, J. A. Ross, Willard Morris on masonry and W. R. Hines, J. A. Ross, Indiana Bridge Co., Massilon Bridge Co. and the Brackett Bridge Co. on the iron work. J. A. Ross had the lowest bid on the three bridges complete, for $18,000. W. R. Hines was next, his bid being $20,000.

FRANKLIN, PA.—Proposals are wanted by July 14 for furnishing all material, labor and building for two stone abutments and archway over Pine Run in Richland Township; also for two stone abutments and archway over Mill Creek, in Frenchcreek Township. E. K. Smiley, County Clerk.

GLENDIVE, MONT.—In the matter of rebuilding two spans and reconstructing the steel bridge across the Yellowstone River at Glendive, it is said that the County Commissioners have ordered that the two spans be rebuilt and the entire bridge be reconstructed by raising the bridge about six ft. and building two or three concrete piers for the bridge to rest upon. The Clerk of Dawson County will prepare plans and specifications for building the remaining spans and receive proposals for doing such work. He will also prepare plans, etc., for the two spans carried out by flood and advertise for proposals for constructing same. Address Chairman of the Board of County Commissioners of Dawson Co. Submit bids on or before Aug. 15. An election will be held July 12 to ascertain if Dawson County shall expend a sum not to exceed $50,000 to rebuild the bridge. (May 19, p. 357; June 23, p. 459.)

GRAND RAPIDS, MICH.—The city of Grand Rapids, we are informed, will build an iron bridge about 600 ft. long, 60 ft. wide at one end and 100 ft. wide at the other.

GREENFIELD, IND.—Address John Manche, County Commissioner, regarding proposals wanted July 10 for a bridge over Sugar Creek in Hancock County.

GUELPH, ONT.—The following are the bidders and prices for the bridges at Fergus and Bosworth, Ont., received by J. Hutcheon, City Engineer:

	Fergus length, 150 ft.	Bosworth length, 118 ft.
The King Bridge Co	$2,552.43	$1,746.76
Hamilton Bridge Works Co...	2,325.01	1,350.00
Imperial Bridge Co.....	2,225.00	1,435.00
Hunter Bros. (Kincardine).....	1,881.00	1,548.00

The Fergus bridge was let to Hunter Bros. and the Bosworth to the Hamilton Bridge Works Co. (June 16, p. 437.)

HANFORD, CAL.—The City Trustees have been petitioned for bridges across Peoples' Ditch on Harris St; also for a bridge on William St. The Street Committee has the matter in charge.

HELENA, MONT.—The County Commissioners have viewed the site at Canyon Ferry for the proposed county bridge across the Missouri River at that point. John H. Farmer, County Surveyor.

HENRIETTA, TEX.—The Commissioners of Clay County have awarded the contracts for the foundations and superstructure to Morgan Rhodes for the iron and steel bridge 110 ft. long over Wichita River for $2,550.

HEREFORD, TEX.—Deaf Smith County will build an iron bridge 120 ft. long over Terra Blanco River at Hereford. The work is to cost $5,000. Address B. F. Fuiler, County Clerk.

HOBOKEN, N. J.—A viaduct, estimated to cost $50,000, will be built from the vicinity of Sixth St., Hoboken, to the top of Jersey City Heights.

HULL, QUE.—The City Council has introduced a by-law to provide $4,500 for a new bridge over Brewery Creek.

INDEPENDENCE, WIS.—Proposals, according to report, are wanted for a steel bridge across Elk Creek.

JERSEY CITY, N. J.—Sealed proposals will be received July 6 by the Board of Chosen Freeholders of Hudson County for a steel bridge over the Pennsylvania RR. cut at Baldwin Ave., Jersey City. John P. Eagan, Clerk.

KANE, PA.—Bids are wanted by J. E. Mullin, Secy., for the proposed steel bridge across the P. & E. RR. tracks in this Borough. Bonds were recently issued to pay for this work. (June 2, p. 392.)

KENTLAND, IND.—The Commissioners of Newton County, E. E. Parsons, Chairman, want bids, according to report, until July 3 for building 10 bridges.

KLAMATH, ORE.—Bids will be received by the Court of Klamath County July 5 for a bridge across what is known as Miller's Creek at the upper or southern end of Langell Valley. The bridge to be either a three-bent or two-crib bridge, at least 70 ft. long, exclusive of approaches. Bidders to furnish all material and submit with their bids sealed plans and specifications for construction; also to deposit 5% of amount of bid. C. H. Withrow, County Clerk.

LAUREL, MONT.—The County Clerk (Billings, Mont.) will receive bids until Aug. 15 for building a four-span Howe truss wagon bridge across the Yellowstone River at Laurel.

LIMA, O.—C. E. Lynch, City Clerk, will receive proposals until July 6 for two steel bridges over Ottawa River. Each bridge will have a span of 80 ft., with a clear roadway of 26 ft.; two sidewalks, each 7 ft. wide.

LIVINGSTON, MONT.—The Clerk of Park County will receive bids until July 15 for construction of a bridge across the Shields River at the crossing on the Springdale road. Bridge to be built according to plans and specifications on file in his office. Bidders may also submit plans and specifications, same to be subject to approval of board. Chas. Angus, County Clerk.

LOGANSPORT, IND.—The Board of Commissioners of Cass County will receive bids until July 5 for the construction and completion of one bridge and two culverts, according to plans on file in the County Auditor's office. Daniel Woodhouse, Chairman.

LOS ANGELES, CAL.—The City Engineer has completed the new plans for the three city bridges soon to be let to contract. (June 9, p. 415.)

LUFKIN, TEX.—In about a month bids will be wanted for an iron bridge about 200 ft. long by the Lufkin Land & Lumber Co., to be built over Angelina River.

MAPLE HILL, ONT.—Proposals are wanted by J. Brocelbank for a steel or combination bridge over the Saugeen River, in the Township of Brant: span 150 ft., roadway 14 ft., load 120 lbs. per sq. ft. Bridge is about two miles from Cargill Station. Plans can be had from Jas. Warren, C. E., Walkerton, Ont.

MARION, ALA.—The following are the bids for the contract to build the steel bridge over the Cahawba River, near Fike's Ferry, in Perry County, received June 21: Southern Bridge Co., Birmingham, Ala., $5,221; Champion Bridge Co., Wilmington, O., $5,298; New Columbus Bridge Co., Columbus, O., $5,660; Virginia Bridge & Iron Co., Roanoke, Va., $5,340; Indiana Bridge Co., Muncie, Ind., $5,250; Geo. E. King Bridge Co., Des Moines, Ia., $5,572; Canton Bridge Co., Canton, O., $5,555; Geo. H. Crafts, Atlanta, Ga., $5,710. (June 16, p. 37.)

MODESTO, CAL.—Bids will be received by the Boards of Supervisors of Stanislaus and Merced Counties, July 8, at the Court House in Stanislaus County, for a draw bridge with trestle and span across the San Joaquin River, near Hill's Ferry. The bid accepted is subject to the approval of the Secretary of War. Address either G. W. Toombs, Chairman; A. S. Dingley, Clerk, or L. H. Hammett, Deputy Clerk, Modesto. (June 2, p. 392.)

A bridge has been petitioned for across Cornell's Creek near La Grange.

MONCTON, N. B.—Contract for the Colpitts bridge over the Pollet River at Forest Glen has been awarded to Wm. R. Fawcett of Petitcodiac at $1,700.

MONTPELIER, VT.—The City Council, at a recent meeting, decided to build a new steel bridge across Winooski River.

NATCHITOCHES, LA.—A combination iron and wooden bridge about 600 ft. long will be built over Red River. Address D. C. Scarborough.

NEW BRITAIN, CONN.—The selectmen on June 20 awarded contracts for the bridges on Lincoln St. extension and the Shuttle Meadow road to Mansworth & Webb, of New Britain.

NEW RICHMOND, WIS.—An iron bridge will be built by the city over Willow River. Other bridges will probably be necessary on account of the recent floods. Address John McClure.

NEW YORK, N. Y.—See "Other Structures."

NOVELTY, WASH.—Bids were opened June 17, by the County Commissioners at Seattle, for the steel bridge across the Snoqualmie River at Novelty. The following bids were received: Puget Sound Dredging Co., $8,480; California Bridge & Construction Co., $8,740, including approaches; Northwest Bridge Co., Tacoma, $9,200; Pacific Bridge Co., $9,950; Seattle Bridge Co., $10,569; Fox & Austin, $14,130, including piers. Savage & Schefield of Olympia also bid on the work. A contract was awarded on the 18th to the Puget Sound Dredging Co. for a combination steel, wood and iron structure for $5,650. (Seattle, May 26, p. 377.)

OAKLAND, CAL.—The delay in building the tidal canal between Oakland harbor and San Leandro Bay is the question of how many bridges are necessary.

ORANGEVILLE, ONT.—The Township Council of Caledon will, according to report, build a steel bridge over the Credit River on the Guelph road.

OWATONNA, MINN.—Bids are wanted July 3 by the City Recorder for a steel bridge 104 ft. long, 18 ft. roadway and 4 ft. sidewalks, over the Straight River at Owatonna.

PATERSON, N. J.—The approaches to the Main St. bridge will be widened. The necessary property is now being condemned, and a report will be made to the freeholders at the July meeting.

PAWTUCKET, R. I.—At a meeting of the Grade Crossing Commission of this city and Central Falls, with officials of the N. Y., N. H. & H., plans were spoken of to abolish five grade crossings, three in Pawtucket and two in Central Falls, which both the cities and the railroad company are desirous of abolishing.

PITTSBURGH, PA.—It is said that the Union Traction Co. will build a bridge on the Brighton Road, over Spruce Hollow.

PLAINFIELD, N. J.—It is said that the Somerset County Board of Freeholders will build a new bridge over Greenbrook, at what is known as West End Bridge.

PRINCETON, WIS.—The Chicago & Northwestern Ry. will build an iron drawbridge about 80 ft. long over the Fox River. The cost has not yet been estimated. Address J. L. Pennifill, 713 N. Y. Life Building, Chicago, Ill.

PORTLAND, ME.—We are informed that the Grand Trunk Ry., in addition to the renewal of the International bridge at Buffalo, recently spoken of in this column, is rebuilding all the bridges, with one exception, between Island Pond, Vt., and Portland, Me. The company is also double tracking the bridges across the Ottawa River at Ste. Anne's and Vandreuil, a short distance west of Montreal, in addition to many other bridges too numerous to mention.

QUEENSBURY, N. Y.—We are informed that Monty Higley & Co., of Sandy Hill, N. Y., have secured the contract at $1,090 for the foundation and superstructure of the steel bridges across Halfway Brook on Bay Head road. There were seven other bids. (June 16, p. 437.)

RAWLINS, WYO.—The new Wyoming Southern will require about five bridges. (See Railroad Construction column.)

RED LODGE, MONT.—The Commissioners of Carbon County have been petitioned for a bridge across Clarke Fork, near the mouth of Bear Creek. The Surveyor was ordered to locate bridge site and make estimate of the cost and report at next meeting.

REGINA, N. W. T.—J. S. Dennis, Deputy Commissioner of Public Works, will receive tenders for a steel bridge over Sturgeon River. Plans to be had from W. R. Gibbons, New Lunnon, N. W. T.

RICHMOND, VA.—It is said that the Chesapeake & Ohio has asked for bids on a steel viaduct.

ROCHESTER, N. Y.—The Supervisors' report for a new bridge across the river between the towns of Greece and Irondequoit, four miles northeast of Rochester, has been accepted.

ROCK RIFT, N. Y.—The Commissioners of Delaware County, according to report, will build a new steel bridge at this place, estimated to cost $8,000.

ROME, N. Y.—The Highway Committee has recommended an appropriation of about $1,700 for bridges and highways. A bridge is planned at the James St. railroad crossing.

SALINA, KAN.—We are informed that the Missouri Valley Bridge Co. of Leavenworth, Kan., has secured the contract for the three steel bridges to be built by Salina County. (June 16, p. 437.)

SAN JOSE, CAL.—The County Supervisors report recommending that a new bridge be built over Alamitor Creek at Hacienda has been adopted.

SCOTTSVILLE, VA.—A mass-meeting will soon be held to plan for a bridge across the James River at this place.

SEALY, TEX.—The Cane Belt RR. Co. will build a bridge about 300 ft. long over the San Bernardo River, between Sealy and Eagle Lake.

SEBASTOPOL, CAL.—J. O. Meeker was awarded contract for a trestle bridge by the County over Green Valley Creek at $1,390.

SEWELL, W. VA.—It is stated that engineers are ascertaining the cost for rebuilding the Sewell bridge, which was destroyed by high water March last. (May 19, p. 357.)

SOMERVILLE, MASS.—F. O. J. Tarbox, Chairman of the Committee on Abolition of Grade Crossings, in a report says that the work on the Fitchburg Railroad would cost between $800,000 and $1,000,000. The expense to the city would be one-tenth of the total cost. The committee has been unable to determine the approximate cost for the abolition of the four grade crossings on the southern division of the B. & M. RR., which runs through the heart of the city, but the grade crossings are few in number.

SOUTH BEND, IND.—St. Joseph County, according to report, will build two steel bridges, for which H. Lewis, of Pittsburgh, is said to be preparing plans.

SPRINGFIELD, VT.—According to report, plans have been prepared for a new bridge in this town.

STURGIS, S. D.—Bids are wanted July 10, according to report, by W. A. Mac Michael, Auditor of Meade County, for a bridge across the Belle Fourche River.

TERRA HAUTE, IND.—Engineer George R. Grimes has completed plans for the proposed new trestle on the Mackville grade. They are on file with the County Commissioners.

THOMASTON, GA.—Proposals are wanted by M. H. Sandwich, Clerk of the County Commissioners, by July 4 for an open under-truss bridge 14 ft. wide, on two stone piers. Approaches are 20 ft. long on one side and 30 ft. on the other side. Proposals are also wanted for a steel bridge of the same dimensions at the same place.

TILDEN, TEX.—The Chicago Iron & Bridge Co., we are informed, has secured a contract for an iron bridge for McMullen County.

TOLEDO, O.—Proposals will soon be wanted for repairing two ice-breakers at the Fassett St. bridge, estimated to cost about $7,000. The matter regarding a new bridge over Swan Creek at Lafayette St. was held over, as there is no money for the work. It is reported that the Lake Shore & Michigan Southern has plans prepared for a new bridge over the tracks at Curtis St.

UNIONVILLE, MO.—The County Bridge Committee of Putnam County will receive bids until July 12 for five combination bridges on pile foundations over various creeks in the county. Three spans will be 28 ft., one of 30 and one of 38 ft., with approaches for each bridge. Two platform bridges, with spans of 45 ft. each, are also to be built. Address Charles E. Bailey, County Surveyor, Hartford, Mo.

URBANA, ILL.—July 11, at the Court House, contracts will be let for building four small steel highway bridges on masonry. Plans and specifications at the office of Ira O. Baker, Champaign, Ill.

VICTORIA, TEX.—The Commissioners of Refugis and Victoria counties will soon receive bids for a bridge about 120 ft. span, to be built over San Antonio River at Terrell's ferry. The work is estimated to cost between $4,000 and $5,000. Victoria County now has five bridges for county passage and six iron railroad bridges. Another bridge is petitioned for over the Guadalupe. The petition will come before the Commissioners at the August meeting. M. Stuart, County Surveyor.

VINCENNES, IND.—Bids are wanted July 10, according to report, by J. S. Spiker, Engineer, for work on various county bridges, estimated to cost about $7,000.

WARRENTON, ORE.—The City Council will build two bridges over the two sloughs on Elm St., between Second and Third Sts.

WASHBURNE, N. D.—Bids are wanted July 3 for bridges over Turtle and Douglas Creeks and Buffalo Coulee; also for the stone abutments. Address August A. Johnson, County Auditor.

WATSONVILLE, CAL.—Proposals are wanted July 3 for a bridge across Corralitos Creek, according to the plans on file in the County Supervisor's office. Bids must be accompanied by check for 2 per cent. of the amount of bid to H. H. Miller, Clerk, County Board.

WEST SPRINGFIELD, MASS.—The bids for the Agawn bridge were opened June 23, but the 13 bids received were in excess of the appropriation, which was about $15,000. A special meeting will soon be held to consider the advisability of voting an additional appropriation for the Agawan bridge.

WHITEHALL, MD.—A contract for a bridge over Gunpowder River has been awarded to the Wrought Iron Bridge Co. This company also has the contract for a bridge on Wilkens Ave., Baltimore, at $1,300.

WILMINGTON, DEL.—It is said that the B. & O. RR. has permission from the city to build the proposed bridge across Fourth St.

The Levy Court, according to report, will replace the wooden bridge across the Brandywine at Seventh St. with an iron structure.

Other Structures.

CANAL DOVER, O.—The Reeves Iron Co., which recently sold part of its plant to the American Tin Plate Co., will continue to operate its merchant and sheet departments. The latter will be enlarged to a ten mill plant.

DENVER, COL.—Herman Luelers, Secretary of the Board of Capitol Managers, will receive bids

until July 15 for iron stairways, bronze metal doors and other work for the Colorado State Capitol.

ENSLEY, ALA.—It is said that the Tennessee Coal, Iron & RR. Co. is securing estimates on a fifth blast furnace to be built at this place.

FT. WAYNE, IND.—The Withington Handle Factory, of Huntington, according to report, will build a new factory in Ft. Wayne.

GIRARD, PA.—The Borough of Girard will receive proposals July 7 for material and for building a system of water-works and electric lighting. This includes 292 tons of cast-iron pipe, boilers, engines and machinery. E. F. Dart, President; C. J. Reeder, Clerk.

HAMMONTON, N. J.—The Hammonton Water Co., according to report, has been granted the right to build a water-works. The company is capitalized at $75,000, and it has an option on the local electric light plant and, it is said, will also build an ice plant.

MENOMINEE, WIS.—Reports state that it is proposed to build a $3,750,000 steel plant here.

NEW YORK, N. Y.—The City Comptroller will sell on July 5 bonds to the amount of $10,025,000, the money to be used for the following purposes: Docks and ferries, $2,000,000; schools, Manhattan and Bronx, $1,700,000; schools, Brooklyn, $1,800,000; schools, Queens, $500,000; schools, Richmond, $100,000; East River Bridge, $250,000; 149th street bridge, $1,000,000; Appellate Division Court House, $375,000; New York Public Library, $500,000; Museum Natural History, $300,000; Department of Correction, $650,000; improvement of parkways, $100,000; Riverside Drive extension to Boulevard Lafayette, $100,000; street cleaning, $300,000; Croton aqueduct, $350,000.

The plans and specifications to serve as a guide for the architects who will compete for the plans of the new Custom House, on the Bowling Green site, have been sent to the various firms and individuals who may compete, by James Knox Taylor, the supervising architest. Sept. 15 is the date to submit plans.

PHILADELPHIA, PA.—Wm. Cramp & Sons Ship & Engine Building Co., according to report, will build an extension to its plant.

PHOENIXVILLE, PA.—It is said that the Pennsylvania Steel Casting Co. of Philadelphia will build a building 90x94 ft. at this place to make steel casting.

PITTSBURGH, PA.—Kaufman Bros., according to report, will build an eight-story fire-proof addition 20 ft. by 95 ft., for which Charles Bickel of Pittsburgh has prepared plans.

According to report, the Keystone Bridge Works will build a new fitting-up shop 250 ft. by 1,000 ft., to be equipped with improved systems of electric cranes and other apparatus.

Phillips, Nimick & Co., are reported as overhauling their plate mill, which will probably result in the construction of a mill of enlarged capacity.

WASHINGTON, D. C.—Estimates are wanted by the Supervising Architect, Treasury Department, Washington, D. C., July 1, for building the extension to the United States temporary postoffice in Chicago.

Bids are wanted July 5 for certain interior changes and for the completion of the extension of the United States postoffice in Minneapolis.

MEETINGS AND ANNOUNCEMENTS.

Dividends.

Canadian Southern.—Semi-annual, 1 per cent., payable Aug. 1.

Lake Shore & Michigan Southern.—Sem-annual, 3½ per cent., payable July 28.

Michigan Central.—Semi-annual, 2 per cent., payable July 28.

Norfolk & Southern.—Quarterly, 1 per cent., payable July 10.

St. Joseph & Grande Island.—First preferred, 1 per cent., payable Aug. 1.

Boston Elevated.—Annual, 3 per cent., payable Aug. 1.

Commonwealth Ave. St. Ry.—Two per cent., payable June 30.

New Orleans City Ry.—Semi-annual, preferred, 2½ per cent., payable July 10.

Technical Meetings.

Meetings and conventions of railroad associations and technical societies will be held as follows:

American Association of General Passenger and Ticket Agents.—The annual convention will be held at Boston, Mass., Oct. 17.

American Society of Civil Engineers.—Meets at the house of the Society, 220 West Fifty-seventh street, New York, on the first and third Wednesdays in each month, at 8 p. m.

American Society of Railway Superintendents.—The annual convention will be held at Detroit, Mich., beginning Sept. 20. C. A. Hammond, Secretary, Asbury Park, N. J.

American Street Railway Association and Street Railway Accountants' Association of America.—The annual convention is set for Oct. 17, at Chicago, Ill. T. C. Pennington, Secretary, 2,020 State St., Chicago.

Association of Engineers of Virginia.—Holds its formal meetings on the third Wednesday of each month from September to May, inclusive, at 710 Terry Building, Roanoke, at 5 p. m.

Association of Railway Superintendents of Bridges & Buildings.—The annual convention will be held Oct. 17, in Detroit, Mich. S. F. Patterson, Secretary, Concord, N. H.

Boston Society of Civil Engineers.—Meets at 715 Tremont Temple, Boston, on the third Wednesday in each month at 7.30 p. m.

Canadian Roadmasters' Association.—The annual convention will be held at Toronto, Sept. 20. J. Drinkwater, Secretary, Winchester, Ont.

Canadian Society of Civil Engineers.—Meets at its rooms, 112 Mansfield street, Montreal, P. Q., every alternate Thursday at 8 p. m.

Central Railway Club.—Meets at the Hotel Iroquois, Buffalo, N. Y., on the second Friday of January, March, May, September and November, at 2 p. m.

Chicago Electrical Association.—Meets at Room 1737, Monadnock Building, Chicago, on the first and third Fridays of each month at 8 p. m. J. R. Cravath, Secretary.

Civil Engineers' Club of Cleveland.—Meets in the Case Library Building, Cleveland, O., on the second Tuesday in each month at 8 p. m. Semi-monthly meetings are held on the fourth Tuesday of each month.

Civil Engineers' Society of St. Paul.—Meets on the first Monday of each month except June, July, August and September.

Denver Society of Civil Engineers.—Meets at 3 Jacobson Block, Denver, Col., on the second Tuesday of each month, except during July and August.

Eastern Maintenance of Way Association.—The annual convention will be held Aug. 16 at Portland, Me. F. C. Stowell, Ware, Mass., Secretary.

Engineers' Club of Cincinnati.—Meets at the rooms of the Literary Club, 25 East Eighth street, on the third Tuesday of each month, excepting July and August, at 6.30 p. m.

Engineers' Club of Columbus, (O.)—Meets at 12½ North High street on the first and third Saturdays from September to June.

Engineers' Club of Minneapolis.—Meets in the Public Library Building, Minneapolis, Minn., on the first Thursday in each month.

Engineers' Club of St. Louis.—Meets in the Missouri Historical Society Building, corner Sixteenth street and Lucas place, St. Louis, on the first and third Wednesdays in each month.

Engineers' Society of Western New York.—Holds regular meetings on the first Monday in each month, except in the months of July and August, at the Buffalo Library Building.

Engineers' Society of Western Pennsylvania.—Meets at 410 Penn avenue, Pittsburg, Pa., on the third Tuesday in each month at 7.30 p. m.

Locomotive Foremen's Club.—Meets every second Tuesday in the club room of the Correspondence School of Locomotive Engineers and Firemen, 335 Dearborn street, Chicago.

Master Car & Locomotive Painters' Association.—The annual convention will be held Sept. 12 at Philadelphia, Pa. Robert McKeon, Secretary, Kent, O.

Montana Society of Civil Engineers.—Meets at Helena, Mont., on the third Saturday in each month at 7.30 p. m.

New England Railroad Club.—Meets at Pierce Hall, Copley Square, Boston, Mass., on the second Tuesday of each month.

New York Railroad Club.—Meets at 12 West Thirty-first street, New York City, on the third Thursday in each month at 8 p. m., excepting June, July and August.

Northwest Railway Club.—Meets on the first Tuesday after the second Monday in each month at 8 p. m., the place of meeting alternating between the West Hotel, Minneapolis, and the Ryan Hotel, St. Paul.

Northwestern Track and Bridge Association.—Meets at the St. Paul Union Station on the Friday following the second Wednesday of March, June, September and December, at 2.30 p. m.

Roadmasters' Association of America.—The annual convention will be held in Detroit, Mich., Sept. 12. J. B. Dickson, Secretary, Sterling, Ill.

St. Louis Railway Club.—Holds its regular meeting on the second Friday of each month at 3 p. m.

Southern and Southwestern Railway Club.—Meets at the Kimball House, Atlanta, Ga., on the second Thursday in January, April, August and November.

Technical Society of the Pacific Coast.—Meets at its rooms, in the Academy of Sciences Building, 819 Market street, San Francisco, Cal., on the first Friday in each month, at 8 p. m.

Traveling Engineers' Association.—The annual convention will be held in Cincinnati, O., Sept. 12. W. O. Thompson, Secretary, Elkhart, Ind.

Western Foundrymen's Association.—Meets in the Great Northern Hotel, Chicago, on the third Wednesday of each month. A. Sorge, Jr., 1533 Marquette Building, Chicago, is Secretary.

Western Society of Engineers.

At a special meeting of the Society at its rooms in the Monadnock Building, Chicago, on Wednesday, June 21, Mr. Isham Randolph, Chief Engineer of the Sanitary District of Chicago, presented the prominent features of his annual report on the Drainage Canal of the Sanitary District of Chicago for 1898. His remarks were illustrated by lantern slides and the meeting was attended by members of the Society and invited guests.

The Iron and Steel Institute.

The autumn meeting of the Iron and Steel Institute (British) will be held at Manchester, August 15 to August 18 inclusive. The programme will include visits to the famous locomotive works of the Lancashire & Yorkshire, at Horwich, and to others of the engineering and manufacturing works in that region. There will also be receptions and various other pleasant affairs.

Engineers' Society of Western Pennsylvania.

The one hundred and ninety-sixth regular monthly meeting of the Engineers' Society of Western Pennsylvania was held in the Lecture Room of the Society's House 410 Penn Ave., Pittsburg, Pa., Tuesday evening, June 20 1899.

It was decided to arrange for an outing for the Society in the early part of July and to charter a boat to go up the river for an excursion. A report was presented from the Smoke Committee as regards the rating of boilers and the best means of preventing smoke. It was ordered printed and distributed to the members.

The paper of the evening, by Mr. F. E. House, General Superintendent, P., B. & L. E. R. R. Co., Pittsburg, Pa., was received with much interest. He described the building of a tunnel, in which the methods were unique in several ways, and more especially in the fact that a great portion of the rock was removed with steam shovels worked by compressed air, the shovels being cut down so as to enter the tunnel. After a very interesting discussion the Society adjourned.

Engineers' Club of St. Louis.

The 491st meeting was called to order at 8:20 P. M. May 17, President Colby presiding. Twenty-five members, no visitors, were present.

The resignation of Mr. Richard McCulloch, as a member of the Board of Managers of the Association of Engineering Societies, was read and accepted. On motion it was voted to make the election of his successor special order at next meeting.

Prof. F. E. Nipher gave a talk on the elongation of steel bars as a function of the temperature and stress. Prof Nipher gave the equation, showing the relation of the several quantities, and discussed the equation, showing graphically the way in which the quantities varied. As data on which to base the truth of the equation is very scant and covers only a comparatively low range of temperature, the agreement between theory and practice is not satisfactory. Special reference was made to the application to welded street railroad track.

The discussion following was participated in by Messrs. Holman, Connor, Kinealy, Russell, Robert Moore, Dunaway.

The 492d meeting was called to order at 1600 Lucas Place June 7, at 8:20 P. M., President Colby presiding. Nominations for members of the Board of Managers of the Associated Engineers' Societies were asked for and W. A. Layman, S. E. Freeman and W. L. Garrels nominated. Messrs. Bennett and Trepp were appointed tellers and announced that Mr. Layman was elected, having received 13 out of 21 votes cast.

Prof. J. H. Kinealy gave a talk on the Pohlé Air Lift Pump. The action of the pump was illustrated by means of a small model. As there is but little literature from which to obtain data for designing, it was necessary to make a lot of experiments, and for this purpose model pumps were made of different dimensions and a series of experiments conducted. The methods of making these experiments were explained and the results given, being illustrated by curves.

Several formulæ were given and discussed. The determination of certain constants, however, is still necessary as the formulæ and practice do not agree very well. Experiments on full sized wells are necessary to secure data for the correct determination of these constants.

Mr. Edw. Flad made some remarks on the Pohlé pumping plant at the Anheuser-Busch Brewery.

PERSONAL

(For other personal mention see Elections and Appointments.)

—Mr. Norman Williams, a prominent lawyer of Chicago, died at Hampton Beach, N. H., June 19. Mr. Williams was born in Vermont, Feb. 1, 1835. He assisted in the organization of Pullman's Palace Car Co., and also took an important part in the formation of the Western Electric Co.

—Mr. Abram Gould died last week in Salem, N. Y. Mr. Gould was Purchasing Agent of the Missouri Pacific Railroad and was a half brother of Jay Gould. He was born at Roxbury, N. Y., in 1843, and began life as a school teacher. In 1860 he was employed as timekeeper in the machine shops of the Rutland & Washington Railroad. In 1873 he went to San Francisco as Purchasing Agent for the Pacific Mail Steamship Co., and later was connected with the Union Pacific in the fuel department at Salt Lake City, and finally was made Purchasing Agent of the Gould railroads.

—Mr. John Godfrey Moore, who first came into prominence in the business world in connection with the Mutual Union Telegraph Co., which was established about 1880, died on Friday of last week at his home in New York City. He was the head of the firm of Moore & Schley, bankers and brokers in Wall Street, New York. He had been for a number of years prominent in organizing and financing large operations and had much to do with the reorganization and transfer of railroad properties. His house has managed the Wall Street end of the Virginia Iron, Coal & Coke Co., a consolidation of iron and steel properties recently formed, as well as of other important projects that have been brought out within the last few months.

—Mr. Henry Bradley Plant, President of the Plant System of Railroads, died in New York on Friday of last week, of heart disease. The Plant System is made up of about 14 different railroads, aggregating nearly 2,100 miles on the South Atlantic seaboard. Subordinate to and closely affiliated with the railroad system is a large holding of steamships and hotels, in all of which great properties Mr. Plant has been the leading power, having organized them and actually created a good many of them. He was born in Branford, Conn., Oct. 27, 1819, received a common school education and began his business career in the express business between New York and New Haven. On the formation of the Adams Express Co. he went South, and in 1854 was appointed Superintendent of the Southern Division of that company. He was also Superintendent of Harnden's Express Co. At the outbreak of the war Mr. Plant organized the Southern Express Co., and has been the President of that company ever since. Mr. Plant's interest in railroads began in 1879, when he acquired a large interest in the Atlantic & Gulf, which was subsequently reorganized as the Savannah, Florida & Georgia. The Charleston & Savannah was acquired in 1880. Since then the Plant System has been gradually enlarged and unified, and it now consists of about 2,100 miles, as above stated.

ELECTIONS AND APPOINTMENTS.

Atchison, Topeka & Santa Fe.—J. W. Dean has been appointed Trainmaster, with headquarters at La Junta, Col., succeeding T. H. Sears, resigned.

Atlantic, Valdosta & Western.—Smith D. Pickett has been appointed General Freight and Passenger Agent, with headquarters at Jacksonville, Fla., succeeding J. T. Medlin, resigned.

Baltimore & Ohio.—At a meeting of the stockholders, held June 26, Oscar G. Murray was elected First Vice-President, and F. D. Underwood Second Vice-President and General Manager. George H. Campbell has been appointed Assistant General Superintendent, with headquarters at Baltimore, Md. Effective July 1.

Boise, Nampa & Owyhee.—At a meeting of the stockholders, held at Nampa, Ida., the following Directors were elected: W. H. Dewey, E. H. Dewey, E. H. Jennings of Pittsburg, Mike Murphy of Pittsburg, Howard Sebree of Caldwell, Timothy Regan, R. E. Green and W. E. Borah.

Burlington & Northwestern.—At a meeting of the stockholders, held June 21, the following officers were elected: President, T. W. Barhydt; Vice-President, J. T. Remey; and Secretary and Treasurer, R. M. Green. The Directors are T. W. Barhydt, J. T. Remey, W. W. Baldwin, W. F. McFarland, J. W. Blythe, C. P. Squires, H. B. Scott, Horace S. Rand and William Carson.

Burlington & Western.—At a meeting held June 21, the following officers were elected: President, T. W. Barhydt; Vice-President, C. P. Squires; and Secretary and Treasurer, R. M. Green. At the same meeting the following were elected Directors: T. W. Barhydt, C. P. Squires, W. W. Baldwin, J. W. Blythe and H. B. Scott.

Canadian Pacific.—G. H. Shaw has been appointed Assistant General Freight Agent of the Western Division, comprising main line and branches, Port Arthur to Laggan and Fernie, with headquarters at Winnipeg, Man. Allan Cameron has been appointed Assistant General Freight Agent of the Pacific Division, comprising main line and branches west of Laggan, with headquarters at Vancouver, B. C. F. W. Peters has been appointed Assistant General Freight Agent of the Kootenay and Boundary Creek Districts, comprising lines west of Fernie and south of Golden, Arrowhead and Penticton, with headquarters at Nelson, B. C. Effective July 1. E. J. Coyle has been appointed Assistant General Passenger Agent of Pacific Division, Kootenay and Pacific Coast, with headquarters at Vancouver, B. C. Wm. Stitt has been appointed Assistant General Passenger Agent of Western Division, with headquarters at Winnipeg, Man. C. E. McPherson has been appointed General Passenger Agent of Lines West of Lake Superior, with headquarters at Winnipeg, Man., instead of being appointed Traffic Manager, as incorrectly stated in our issue of June 16, p. 438.

Chesapeake & Ohio.—C. P. Snow has been appointed Trainmaster, with headquarters at Lexington, Ky.

Chesapeake Beach.—Guy Adams has been appointed General Freight and Passenger Agent.

Chicago Terminal Transfer.—S. R. Ainslie, Vice-President and General Manager, with headquarters at Chicago, Ill., has resigned. Effective Aug. 1. Mr. Ainslie remains with the company as a Director.

Choctaw & Memphis.—The jurisdiction of J. F. Holden, with headquarters at Little Rock, Ark., Traffic Manager of the Choctaw, Oklahoma & Gulf, has been extended over the C. & M., a subordinate line of the C., O. & G.

Cleveland, Akron & Columbus.—E. A. Ford has been appointed General Passenger Agent. C. L. Kimball has been appointed Assistant General Passenger Agent. Effect June 19.

Colorado & Southern.—T. H. Sears, heretofore Trainmaster of the Atchison, Topeka & Santa Fe, has been appointed Division Superintendent of the C. & S., with headquarters at Denver, Col.

Cumberland Valley.—Charles E. Pugh and N. Parker Shortridge were, on June 21, elected Directors, succeeding Frank Thomson and J. N. Hutchinson, deceased.

Denton & Western.—The officers of this company, referred to in the Construction column, are: President, J. P. Blount; Vice-President, J. N. Rayzor; Secretary, P. C. Withers; Treasurer, W. A. Ponder; Attorney, J. T. Bottorf. These men, with J. W. Cook, A. E. Graham, John A. Hann and G. W. Wilson, constitute the first board of directors. The central office is Denton, Tex.

East Louisiana.—N. G. Pearsall has been appointed General Manager, with headquarters at Covington, La.

Kansas, Oklahoma Central & Southwestern.—The officers of this company, which is a part of the Atchison, Topeka & Santa Fe, and which is now building, are as follows: Chairman of the Board, Aldace F. Walker; President, Edward P. Ripley; First Vice-President, Edward D. Kenna; Second Vice-President, Paul Morton; Secretary and Treasurer, Edward Wilder; General Counsel, Victor Morawetz; and General Auditor, H. C. Whitehead. The Directors are as follows: Aldace F. Walker, New York; Edward P. Ripley, Edward D. Kenna, Chicago; Henry E. Asp, U. C. Guss, W. H. Merten, Guthrie; Frank Dolan, Wichita; John F. McNally, Arkansas City; Samuel M. Porter, Caney.

Minneapolis, St. Paul & Sault Ste. Marie.—George R. Huntington has been appointed Superintendent, with headquarters at Minneapolis, Minn., succeeding F. C. Batchelder, resigned.

New Orleans & Northwestern.—F. W. Main has been appointed Purchasing Agent, with headquarters at Natchez, Miss., succeeding C. G. Vaughn, transferred.

New Orleans & Western.—The title of Vice-President and General Manager W. C. Dotterer was on June 1 changed to Receiver and General Manager.

Northern Alabama.—R. B. Pegram, Division Superintendent at Memphis, Tenn., of the Southern, has been appointed Superintendent of N. A.

Northern Pacific.—B. E. Palmer has been appointed Supervisor of the Rocky Mountain Division. Effective June 21.

Old Dominion Steamship Co.—Herbert B. Walker has been appointed Traffic Manager, with headquarters at New York. Capt. J. A. Smith has been appointed General Superintendent, and F. H. Weeks has been appointed Assistant General Superintendent. Effective July 1.

Omaha, Kansas City & Eastern.—J. W. Stokes has been appointed Master Mechanic, with headquarters at Stanberry, Mo., succeeding C. A. De Haven, resigned.

Oregon Short Line.—J. M. Bennett has been transferred to the Idaho Division as Superintendent of Bridges and Buildings, with headquarters at Pocatello, Ida.

Peoria & St. Louis.—The officers of this company, referred to in the Construction column, are: President, Turney English; Secretary, T. W. S. Kidd; Chief Engineer, E. F. Harper, all of Springfield, Ill.

Perkiomen.—At a meeting of the stockholders, held June 21, Jacob B. Hillegaas, Esq., was elected a Director, succeeding John Slingluff, deceased.

Pittsburgh, Cincinnati, Chicago & St. Louis.—A. J. Cassatt has been elected President.

Rio Grande Western.—Walter Hinchman has been elected Treasurer and Geo. A. Krause Secretary, with headquarters at New York, succeeding Charles W. Drake, resigned.

St. Louis & North Arkansas.—This company, whose incorporation was noted in our Construction column, June 9 (p. 418), has organized with the following officers: President, Chas. H. Smith; Vice-President, R. C. Kerens, Jr.; Treasurer, F. W. Schwarte; Secretary, George West. The principal office is Eureka Springs, Ark.

Southern.—J. H. Barrett, heretofore General Superintendent of Transportation, has been appointed General Superintendent. J. A. Dodson, heretofore Superintendent Track, Bridges and Buildings at Greensboro, N. C., has been appointed Superintendent of Transportation. D. W. Lum, heretofore Superintendent Track, Bridges and Buildings at Atlanta, Ga., has been appointed Assistant General Superintendent of Maintenance, a position recently created. The office of General Superintendent of Transportation has been abolished. Thomas Bernard has been appointed Superintendent Track, Bridges and Buildings, with headquarters at Greensboro, N. C., his jurisdiction to include the Washington, Richmond and Norfolk Divisions. R. Southgate has been appointed Superintendent Track, Bridges and Buildings, with headquarters at Charlotte, N. C., his jurisdiction to include the Charlotte, Columbia and Charleston Divisions and that portion of the Atlantic Division between Greenville and Belt Junction, including its branches. J. S. Lemond has been appointed Superintendent Track, Bridges and Buildings, with headquarters at Atlanta, Ga., his jurisdiction to include the Atlanta Division, except the line between Greenville and Belt Junction including its branches, and the Birmingham, Macon and Anniston Divisions. J. E. Platt has been appointed Superintendent of Track, Bridges and Buildings, with headquarters at Knoxville, Tenn., his jurisdiction to include the Knoxville, Asheville, Memphis and Louisville Divisions. W. L. Connelly has been appointed Trainmaster, with headquarters at Selma, Ala. All appointments effective July 1.

Spokane Falls & Northern.—H. A. Jackson has been appointed General Freight and Passenger Agent, with headquarters at Spokane, Wash., succeeding C. G. Dixon, deceased.

Sullivan County.—At a meeting of the stockholders Alfred T. Batchelder, of Keene, N. H., was elected a Director.

Tennessee Coal, Iron & RR.—Frederick H. Benedict has been elected a Director, succeeding C. M. McGhee.

Western Passenger Association.—E. E. McLeod, heretofore Assistant General Passenger Agent of the Chicago, Rock Island & Pacific, at Chicago, Ill., has been elected Chairman of the W. P. A., succeeding B. D. Caldwell, resigned.

Wyoming Southern.—The officers of this company, referred to in the Construction column, are: President, H. A. Framback, Denver, Colo.; General Manager, H. H. Boyce, New York; Secretary, F. Chatterton, Cheyenne, Wyo.; Chief Engineer, T. J. Milner, Denver.

RAILROAD CONSTRUCTION,
New Incorporations, Surveys, Etc.

ABINGDON & DAMASCUS.—A charter has been granted to this company to build a line from Damascus, Va., south to Shady Valley in Johnson County, Tenn.

ALABAMA & FLORIDA.—Surveys are in progress in the vicinity of Marianna, Fla., for the extension of this line south from Andalusia, Ala., to the Gulf. About 30 miles of track is laid. E. L. More of River Falls, Ala., is President. (June 16, p. 439.)

ARKANSAS, GUTHRIE & CALIFORNIA.—W. H. McLean of St. Louis, Mo., has the contract for this proposed line from Shawnee, Okla., northwest 56 miles, via Wellston, to Guthrie. (Jan. 20, p. 52.) H. L. Miller of Guthrie is Vice-President. (Official.)

ARKANSAS SOUTHERN.—Twenty miles of track is laid to Middle Fork, La., on this line (Feb. 24, p. 145) from Junction City, Ark., south, via Ruston, La., to Colfax or Boyce, on the Texas & Pacific. (Official.)

BALTIMORE & OHIO.—Five miles is completed on the Cleveland Terminal & Valley Line from Sandyville, O., east 11 miles, via Magnolia, into coal territory. (Dec. 23, 1898, p. 923.) The work is being done by the C. T. & V. (Official.)

BELLEFONTE CENTRAL.—An official writes with reference to the extension to the Mattern ore banks, that part of the Mattern branch taken up three years ago is being relaid with rails, a distance of 4,000 ft. (June 23, p. 460.)

BELLINGHAM BAY & BRITISH COLUMBIA.—C. W. Northen of Lynden, Wash., has the contract for building a mile of road from Goshen, Wash., to Hansens. (Jan. 13, p. 32.) The company also proposes to make an extension of 25 miles from the main line to coal mines. (Official.)

BELLINGHAM BAY & EASTERN.—This company will build 20 miles of line from Lake Whatcom, Wash., into timber lands. (Official.)

BLACK DIAMOND.—Albert Boone, of Zanesville, O., promoter of this system, has addressed a letter to the Mayor of Des Moines, Ia., offering to give that city a belt line 40 miles in circumference, connecting with the main line on the east, and a cut-off to Omaha on the west, passing through Guthrie Center, Ia. The offer is to be referred to the City Council at its next meeting. The northern extension of the B. D. is to run through Iowa into the Dakotas. (May 5, p. 323.)

BLACKWELL & SOUTHERN.—The Starr-Stubbs Construction Co. of Lawrence, Kan., has the contract for grading on this line of the Atchison, Topeka & Santa Fe from Braman, Okla., to Blackwell, about eight miles. The work is very light. The maximum grade is 0.8%; the maximum curve 3 deg. There will be one truss bridge of 150 ft.

Articles of incorporation were recently filed for an extension from Blackwell south about 40 miles to Perry. (June 16, p. 439.)

BROOKVILLE.—Half a mile of track is laid on the spur from Summit, Pa., to the head of Clear Creek, about three miles. The company proposes to keep a small number of men grading until fall for winter logging. (April 14, p. 271.) G. W. Smith of Brookville, Pa., has the contract. (Official.)

BUFFALO, ROCHESTER & PITTSBURGH.—This company has completed its entire line from Punxsutawney, Pa., west 60 miles to Butler. (May 26, p. 379.)

CALIFORNIA ROADS.—The Ventura Business Men's Club is pledged to aid some company to build a line from that city, north about 80 miles, to connect with the Atchison or Southern Pacific, at Bakersfield.

CANADIAN PACIFIC.—Agreement has been made by this company with the Great Northern, according to report, to build a joint line from Midway, B. C., south 35 miles to Republic, Wash.

Representative farmers and merchants of southwestern Manitoba have been to Winnipeg recently, urging this company to build spur lines in that portion of the Province from points on the Pembina branch to the International boundary. It is said that the company will ask legislation to enable it to build the lines this season.

It is proposed to build a branch from Kalabar (B. C.) Station to the marble quarries on Marble Lake, via Flinton, Harlowe and Cloyne, giving access also to the gold, iron and mica mines in those regions.

CANE BELT.—In accordance with the amended charter, surveys are now in progress for the extension from Eagle Lake, Tex., northeast about 17 miles to Sealy, on the Missouri, Kansas & Texas. The company expects to begin grading this month. Another party of surveyors will begin making surveys soon for the extension from Bonus south about 75 miles to tidewater. When the two extensions are completed the company will have about 105 miles of road. The intention is to have the grading done by contract. Contract has been closed for 50 miles of rails and the company will need 50 miles more in a short time. No securities as yet have been issued for the 12 miles in operation, and the company will shortly be in the market for financial arrangements for the mileage completed and for additional extensions. (June 16, p. 439.) W. T. Eldridge of Eagle Lake, Tex., is Vice-President.

CARROLLTON SHORT LINE.—At a meeting of the stockholders on June 6, at Carrollton, Ala., it was voted to increase the capital stock to $100,000, to build this line from Carrollton, Ala., northeast 10 miles to Reform, on the Columbus & Montgomery division of the Mobile & Ohio. O. L. McKinstry is President, and W. C. Robertson Secretary, both of Carrollton. This is the project referred to recently under Alabama Roads. (June 23, p. 460.)

CENTRAL OF NEW JERSEY.—With reference to the rumored branch from Bound Brook, N. J., to Chimney Rock, the General Superintendent writes that there has been considerable talk, but as yet nothing definite has been determined upon.

CHESTER, PERRYVILLE & STE. GENEVIEVE.—This company completed nine miles of extension (April 7, p. 252) from St. Marys, Mo., northwest to Ste. Genevieve. (Official.)

CHICAGO & NORTHWESTERN.—This company has 246.6 miles of track now building in three states, all of which has been referred to at various times in these columns:

In Minnesota from the Iowa State line to a point 26 miles north of Sanborn, 85.6 miles, and from Mankato to New Ulm, 24 miles, making a total of 109.6 miles.

In Wisconsin, extension of the Wisconsin & Northern from Dabeno north 10 miles.

In Iowa from Mondamin to Boyer, 61.3 miles; from Lake Dawson to Denison, 24.7; from the Minnesota State line to Burt, 33.6 miles; the Boone County cut-off between Boone and Ogden, 7.4 miles, making a total of 127 miles. (Official.)

CHICAGO, BURLINGTON & QUINCY.—Graders are at work on the Nebraska, Wyoming & Western line from Alliance, Neb., west to Gering. It is stated that the road is to be extended as far as Hartville, Wyo., and perhaps on to the Elk Mountain coal fields in Carbon County, Wyo., via Saratoga, and on to Salt Lake City, Utah. Agents of the company are said to be at Saratoga buying grounds for depot buildings and yards. (May 12, p. 243.)

CHICAGO, MILWAUKEE & ST. PAUL.—Grading is begun, according to report, at Fox Lake, Ill., on a line to run southeast about 20 miles to Libertyville to connect with a branch of the C., M. & St. P., which is understood to be building the line.

Surveyors have been put at work this week to complete the survey for the line from Spirit Lake, Ia., north 19 miles to connect with the Southern Minnesota Division, at or near Lake View, Minn., a small station west of Jackson. As already noted, the company proposes to connect Fonda and Spencer, Ia., to the south. (May 19, p. 359.)

CHICAGO TERMINAL TRANSFER.—The extension from Harvey, Ill., south about nine miles to Chicago Heights, is reported to be nearly completed and will probably be opened early next month. (March 24, p. 217.)

COAHUILA CENTRAL.—Surveys are completed from Saltillo, Mex., to Parros on this proposed line from Saltillo to Trefino, 60 miles, and thence to Sierra, Majado, 102 miles. This survey is to be submitted to the Mexican Government for approval on July 10. C. E. Corn, of Saltillo, has the contract. S. J. Mankin, of Saltillo, is President, and W. E. Darwin, 304 Tacoma Building, Chicago, is General Manager. (Dec. 16, 1898, p. 903.)

COLORADO & WYOMING.—A map has been filed showing the route of this line. It is to be 14 miles long, running from a point on the Colorado & Southern northeast to Hartville, Wyo.

CUBAN RAILROADS.—General Greenwood has returned to Havana to carry forward his plan for which he has a concession to connect Santiago Province with Havana by a railroad, running to Santa Clara, where it will connect with the existing system. General Greenwood claims that this concession was not affected by the resolution adopted by the American Congress forbidding the giving or sale of franchises by the military authorities.

DENTON & WESTERN.—This company has been organized in Texas to build a railroad from Denton,

on the Omaha, Kansas & Texas, to run west eight miles to Krum, on the Atchison, Topeka & Santa Fe. The officers are given under Elections and Appointments.

EAST TINTIC.—Several surveys are completed for this proposed line from Mammoth, Utah, on the Oregon Short Line, to several neighboring mines.

EL PASO & NORTHEASTERN.—During the six months this company has built 19.07 miles of track from Alamogordo Junction, N. M., to Temporal, and 19 miles on the branch from Jarilla Junction, N. M., to Jarilla. There are 60 miles more of track to be laid from Temporal northeast to Salida, N. M. (April 28, p. 305.) G. S. Good & Co., Lock Haven, Pa., and Alamogordo, N. M., have the contract. (Official.)

EVANSVILLE & TERRE HAUTE.—Reuhman & Pfafflin of Evansville, Ind., have the contract for seven miles of extensions from Shelburne, Ind., to Star City, three miles, and from Hymeria to New Pittsburgh, four miles. (Official.)

GREAT NORTHERN.—Surveys have been completed, according to report, for the extension to Republic, Wash. The probable route is from Davenport on the old Seattle, Lake Shore & Eastern, north down Hawk Creek; thence along the bank of the Columbia through Hell Gate canyon, then across the Columbia River on a bridge and up the San Poil River to Republic. Other surveys in progress indicate that the line may be carried north to the International boundary. (March 3, p. 161. See also the Canadian Pacific above.)

FAYETTEVILLE & ALBEMARLE.—North Carolina press reports state that six miles of track is laid on this line from Southern Pines, N. C., east about 30 miles to Fayetteville.

FLORENCE & CRIPPLE CREEK.—This company has built two miles of road this year on its Golden Circle line in Colorado from the Mine Victor to Vista Grande, one mile, and from Last Dollar Mine to Lillie mine, one mile. It proposes to extend the line from Vista Grande to Cripple Creek, six miles. (Official.)

GLOBE, PHOENIX & COPPER BELT.—This company was incorporated in Arizona June 14, with a capital stock of $5,000,000, to build a railroad from Globe, the terminus of the new Gila Valley, Globe & Northern, to run west about 80 miles to Phoenix. The incorporators are Chas. E. Coloney, Henry Fry, E. L. Lester, Philadelphia, Pa., and J. A. Kurtz, and L. H. Chalmers, Phoenix, Ariz.

GULF & BRAZOS VALLEY.—W. A. Squires, of Henrietta, Tex., President, is quoted as stating that the grade is completed from Lampassas, Tex., to Comfort, 65 miles, and that grading is in progress from Mineral Wells to Jacksboro, 30 miles. Rails are laid from Peck City to Mineral Wells, 10 miles. The road as projected is from the Red River, south 360 miles via Peck City, Lampassas and Mineral Wells to Houston, Tex., with a branch from Lampassas via Blue Grove, Squirrelsville and Jacksboro to Eagle Pass. The line is surveyed from the Red River to Peck City, 110 miles, and is under survey to Lampassas, 130 miles. (March 10, p. 179.)

HOLLY RIVER & ADDISON.—Track is laid as far as Big Run, W. Va., 3½ miles beyond Diana, and 20 miles from Palmer. The company will build at once as far as Jumbo, 21 miles, and proposes a further extension to Addison, 10 miles. (May 12, p. 343.) John T. McGraw of Grayton, W. Va., is President, and Geo. A. Hechmer of Palmer is General Manager. (Official.)

IAEGER & SOUTHERN.—This company has laid five miles of track to Crane Creek, W. Va., on its proposed line from Iaeger to Jacobs Fork, 26 miles. (Feb. 10, p. 108.) Wm. D. Janey of Welch, W. Va., is Chief Engineer. (Official.)

IDAHO MIDLAND.—The route of this line, which was incorporated June 3 in Idaho, is from the mouth of Boise River in Canyon County, Ida., to run east and northeast via Caldwell, Boise City, Pine Grove, Vienna, Clayton, Challis, Salmon City and Gibbonsville to Idaho Mountain, an estimated distance of 364 miles. The incorporators are: Thomas W. Bates, Weiser, Ida.; Horace E. Neal, George S. Glover, James A. Rumey and Orville E. Jackson, Boise, Ida. (June 16, p. 439.)

ILLINOIS & MISSISSIPPI VALLEY TERMINAL.—This company was incorporated in Illinois, June 23, with a capital stock of $100,000, to build a railroad from Alton south about 20 miles via Edwardsville, East Alton, Granite City, East St. Louis, O'Fallon and Belleville to East Carondelet. The incorporators are Wm. Elliott Smith, Geo. M. Levis, Chas. Levis, R. H. Levis and Harry W. Ferguson of Alton.

ILLINOIS CENTRAL.—In addition to the 22 miles of track laid on the Yazoo Delta extension (April 28, p. 305) from Ruleville, Miss., north to Tutwiler, the company has completed 15 miles of extension south from Moorhead to Lake Dawson. (Official.)

INVERNESS & RICHMOND.—Work was begun last week on this line, and the contractors propose to push the grading with all speed. Thirty miles must be completed, according to contract, by Dec. 31. The line, as projected, is from Port Hastings, N. S., to Broad Cove, 57 miles. D. D. Mann, of Mackenzie & Mann, has the contract.

IOWA & MISSISSIPPI VALLEY.—This company has been organized at Burlington, Ia., with a capital stock of $300,000, to build a railroad from Elrick, the terminal of the new Muscatine North & South, to run south about 23 miles to Burlington. The people of Burlington have agreed to subscribe $1,000,000 in stock and to give terminals and right of way in the city. The road will be built as soon as the franchises are secured. W. R. Stewart of Elrick, President of the M. N. & S., is interested.

KANSAS & TEXAS COAL.—This company during the year has built four miles of track from Ardmore, Mo., north. Last year it built three miles from Bevier, Mo., south. The work is being done by the company. (March 31, p. 235.) George B. Leighton of St. Louis, Mo., is Vice-President. (Official.)

KANSAS CITY, PITTSBURGH & GULF.—Permission has been granted to the Receivers to issue $800,000 of receivers' certificates to make necessary improvements, buy rolling stock, etc.

KANSAS CITY, FT. SCOTT & MEMPHIS.—A Memphis press dispatch states that preparations are being made to raise the track on the Arkansas side of the Mississippi, between 4 and 5 ft., from Bridge Junction to a point beyond Four-Mile Vail.

KANSAS, OKLAHOMA & GULF.—This company has completed 12 miles of track to Yoakum, Okla. Ter., of which two are in Kansas, in its proposed line from Cale, Kan., south 22 miles to Blackwell. It is being built for the St. Louis & San Francisco. (April 14, p. 271.) Ed. L. Peckham of Blackwell, O. T., is President. (Official.)

MARSHALL, TIMPSON & SABINE PASS.—This company has built none of its proposed extension as yet, but will put a surveying party into the field soon to locate from Timpson, Tex., southeast about 30 miles to San Augustine. (Jan. 20, p. 53.) T. S. Garrison is General Manager. (Official.)

MARYLAND ROADS.—A. B. Knabb & Co., of Krug, Md., have completed one mile of track from Hoyes Run to Deep Creek, Md., and are building an additional mile to Muddy Creek. (June 9, p. 417.) Henry Lines of Oakland, Md., has the contract. (Official.)

MEXICAN ROADS.—The Oaxaca-Chippas RR. Construction Co., of Mexico, has been incorporated in New Jersey, with a capital stock of $250,000, to build railroads in Mexico. The incorporators are: William Warren, William Burnham, Charles Mackie, Daniel Reinhard, James Townsend, Frederick Stinson and Francis White.

MICHIGAN CENTRAL.—In accordance with the usual annual replacement of rail, this company is replacing 65-lb. with 80-lb. rails on the east-bound track in the neighborhood of Pelton, Ont. (June 16, p. 439.)

MINNEAPOLIS & ST. LOUIS.—Several carloads of rails have been received for the extension from New Ulm, Minn., south 135 miles to Storm Lake, Ia. (May 12, p. 343.)

MISSISSIPPI RIVER, COLESBURG & MANCHESTER.—A Boston syndicate has offered to take the bonds for this road and it is to be built this year, beginning this month. The line, as projected, is to run from Dyersville, Ia., 16 miles, via New Vienna and Petersburg, to Colesburg. (May 12, p. 343.) James Prentice of Colesburg, Ia., is President. (Official.

MISSOURI PACIFIC.—An ordinance has been asked for by the St. Louis, Iron Mountain & Southern for an extension in the city of Little Rock, Ark.

MISSOURI ROADS.—Application was made to the St. Louis County Court at Clayton, June 19, for a franchise to build a belt line around the city of St. Louis to compete with the lines of the Terminal Association. Among the promoters are ex-Mayor Cyrus P. Walbridge, J. C. Wilkinson and Louis W. Post.

MONTREAL TERMINAL.—A bill was before the Canadian Railroad Committee on June 22 to change the name of the Montreal Belt Line Co. to the name given in the title. It is proposed to build an elevated road across the city of Montreal to connect with the wharves and railroads; also spurs to connect with various shipping interests.

NASHVILLE, CHATTANOOGA & ST. LOUIS.—This company has built during the year four miles of extension from Jeff, Ala., southeast, and has two miles additional building. J. E. Goney of Madison Cross Roads, Ala., has the contract. (Official.)

NATCHEZ, COLUMBIA & MOBILE.—Track is laid to a point a mile beyond Saulsbury, Miss., on the extension northeast 12 miles to Pearl River, and the company is building an additional mile. (April 7, p. 253.) C. S. Butterfield of Norfield, Miss., is General Manager. (Official.)

NATCHEZ, URANIA AND RUSTON.—Of the 10 miles building from Urania, Ia., to Hinton, four miles to Castor is completed. The line is projected from Natchez, Miss., northwest 122 miles, via Urania, to Ruston. (Feb. 17, p. 132.) It is being built by the Urania Lumber Co., of which H. E. Hardtner is President. (Official.)

NATIONAL TEHUANTEPEC.—The Mexican Government has completed arrangements for settling with the bondholders of this company, and has instructed Pearson & Co., the contractors, to begin work at once on the Pacific & Gulf ports. (May 12, p. 343.)

NEVADA — CALIFORNIA — OREGON.—Fifteen miles of road is reported completed on the line from Amadee, Cal., west toward Susanville, about 20 miles. The General Manager, however, informs us that this is not being built by the N. C. O., but by a separate company. (April 7, p. 253.)

NORTH CAROLINA ROADS.—The Cape Fear Lumber Co., Wilmington, N. C., is building a railroad through its timber lands from a point on the Cape Fear River below Elizabethtown, to run southwest 20 miles via Clarkton, on the Seaboard Air Line, to a point probably on the Atlantic Coast Line.

J. R. Oates of Shelby, N. C., has the contract for this line from Shelby north 9.2 miles to Laundale. (March 17, p. 197.) It is being built by the Cleveland Cotton Mills at Laundale, of which H. F. Schenck is President. (Official.)

NORTHERN PACIFIC.—Twelve miles of track is laid east from Potlatch, Id., on the Clearwater Short Line, from Lewiston, Id., east 75 miles toward Missoula, Mont. (March 3, p. 161.) Wrenn & Greenough have the contract. (Official.)

Foley Bros. of St. Paul have the contract for the Sykeston extension (Oct. 28, 1898, p. 786) in North Dakota, from Sykeston west 15 miles to Bowdon. (Official.)

The contract for the Cooperstown branch extension (April 7, p. 253) from Cooperstown, N. D., northwest 26 miles to McHenry, is let to A. Guthrie & Co., St. Paul. (Official.) Preliminary surveys are completed, according to report, for the cut-off near Seattle, Wash., on the main line to run from Palmer, west 20 miles to Kent. (April 7, p. 253.)

NORTHWESTERN RAILROAD OF SOUTH CAROLINA.—Under this title the company formerly known as the Wilson & Summerton (May 5, p. 324) is building this line from Sumter, S. C., north 31 miles to Camden. Thomas Wilson of Wilson, S. C., is President. (Official.)

OFFERMAN & WESTERN.—This company has been incorporated in Georgia, with a capital stock of $200,000, to build a railroad from Offerman, in Pierce County, on the Savannah, Florida & Western line of the Plant System, to run northwest through Appling and into Coffee County. Henry P. Talmadge of New Jersey and Frank B. Haviland of New York are incorporators.

OMAHA BRIDGE & TERMINAL.—This company has completed another mile of its terminal at Omaha, Neb. The terminals across the river at Council Bluffs were completed last year. (April 14, p. 272.) John R. Webster of Omaha is Vice-President and General Manager. (Official.)

OREGON RAILROAD & NAVIGATION.—This company proposes to build an extension from Elgin, Ore., east 63.3 miles to Joseph. (Official.)

OREGON SHORT LINE.—An official writes that surveys are in progress through the city of Boise, Ida., in connection with a branch running from Nampa to Boise. Should the company be able to get the same grade that it has now from Nampa to a point east, say Orchard, it may build a line across and run its passenger trains that way, but nothing as yet is determined. (June 23, p. 461.)

The Thompson Mercantile Co., of St. Anthony, Ida., has the contract for delivering 1,000,000 ties between Aug. 15 and Sept. 15, for this new line from Idaho Falls northeast 39 miles to St. Anthony on the Snake River. This is under the St. Anthony incorporation recently noted. (June 2, p. 393.)

OSHKOSH & STEVENS POINT.—Surveys are reported in progress for this proposed line from Stevens Point southeast about 70 miles to Oshkosh. The company was incorporated in Wisconsin last October and J. W. Edwards of Winneconne, Wis., was an incorporator. (Nov. 11, 1898, p. 804.)

PEORIA & ST. LOUIS.—Surveys and location are completed and building is under way for this line from Peoria, Ill., south about 55 miles to Springfield. The company expects to have it completed by Nov. 1. There is five miles of track laid and 12 miles graded. About 11,000 ft. of trestle will be built. D. L. Wing of 116 South Sixth St., Springfield, Ill., is the contractor. Cummings & Co., 20 Broad St., New York, represent the company in the East. (June 16, p. 439.) The officers are given under Elections and Appointments. (Official.)

PHILADELPHIA & READING.—This company, according to report, is building new sidings below Spring Mill, in Lehigh County, Pa., to accommodate several thousand cars.

PINE BLUFF & WESTERN.—This company has been incorporated in Arkansas, with a capital stock of $250,000, to build a railroad from Pine Bluff west 25 miles to Sheridan, in Grant County. The Directors are: W. E. Sawyer and J. H. MacMillan, La Crosse, Wis.; E. L. Arnold, Minneapolis, Minn.; W. H. Langford, F. H. Head, Pine Bluff; T. F. Doyle, Sheridan.

PITTSBURGH & ALLEGHENY.—This company has been incorporated in Pennsylvania, with a capital stock of $100,000, to build a railroad from a point in the city of Pittsburgh to run northwest and west to the Allegheny River. The Directors are: G. E. Macklin (President), Bryon Robertson, Charles V. McGlaughlin, P. O. Jenks and A. R. Bassett.

RIO GRANDE WESTERN.—Twelve miles of track is laid into the canyon on this line now building from Provo, Utah, northwest 22 miles to Charleston (June 9, p. 418). Deal Bros. & Mendenhall and H. & T. Roylance of Springville, Utah, have the contract. (Official.)

SAN DIEGO, CUYAMACA & EASTERN.—California press reports state that this line may be extended from Foster, Cal., about 65 miles in the Desert. It now runs from San Diego northeast 25.4 miles to Foster.

SAN FRANCISCO & SAN JOAQUIN VALLEY.—On account of the difficulty of getting bridge material from eastern mills, the completion of this road into San Francisco may be delayed until December. The steel for the 1,600 ft. viaduct across one end of the Alhambra valley in the Contra Costa hills has arrived at Stockton. The 5,700 ft. tunnel has been bored with the exception of 200 ft., and it will be finished by the middle of July. Tunnel No. 5, 1,300 ft. long, is completed. Tunnel No. 4, 300 ft. long, has 90 ft. yet to be bored. Tunnel No. 1, which is near Point Richmond, is to be 800 ft. and is about half completed. Tunnel No. 2, just east of No. 1, is 1,100 ft. long and is practically finished. (June 9, p. 418.)

SEABOARD AIR LINE.—M. J. Condon, of Knoxville, Tenn., is reported to have taken the contract for the line from Cheraw, S. C., southeast to Camden, and from Camden to connect with the Florida Central & Peninsular at Columbia. (June 23, p. 461.)

SOUTH BUFFALO.—The New York State Railroad Commission has granted right of way to this company for its line from Buffalo south eight miles to West Seneca on the Lake Shore & Michigan Southern. John J. Albright of Buffalo is President. (June 23, p. 461.)

SOUTHERN.—This company is relaying its line between Chattanooga and Atlanta, Ga. with 80-lb. rails. The company is also improving the recently acquired Florence, Ala., branch. The track is being ballasted and a new trestle built.

Surveys are reported in progress for an extension from Burgin, Ky., southeast about 12 miles to Lancaster. It is stated that this extension may be graded as far as Jellico, just across the Tennessee line.

It is proposed to change the Danville & Western to standard between Danville, N. C., and Spray, and to extend it to Madison, 12 miles further west.

SOUTHERN PACIFIC.—During the six months of 1899 this company has completed 2½ miles on its gap at Surf, Cal.; 10.4 miles on the Lompoc branch (June 16, p. 439); 4.6 miles of extension of the Guadalupe branch, and 4.6 miles of loop into Anaheim, Cal. (Official.)

Surveys are reported in progress for a line from Anaheim, Cal., north about 10 miles, through Fullerton, to connect with the Whittier branch of the S. P.

SOUTH POTOMAC.—This company was incorporated in West Virginia, June 22, with a capital stock of $1,000, which may be increased to $3,000,000, to build a railroad from Romby southwest about 60 miles to Franklin in Pendleton County. Among the

incorporators are B. J. Baker of Petersburg, W. H. Boggs of Franklin and J. W. Gilkeson of Moorefield, W. Va.

STREATOR & CLINTON.—This company was incorporated in Illinois, June 20, with a capital stock of $5,000, to build the extension of the Indiana, Illinois & Iowa from Streator, Ill., west through the counties of Putnam, Bureau and Whiteside to East Clinton. T. P. Shonts of Chicago, President of the Indiana, Illinois & Iowa, and other officials of that company are incorporators. (June 23, p. 461.)

TAVARES & GULF.—Three miles of track is laid from Oakland to Winter Garden, Fla., on the 6½ miles of extension east to Oconee. (Jan. 6, p. 16.) W. B. Tucker of Orlando, Fla., is General Manager. (Official.)

TENNESSEE CENTRAL.—Jere Baxter of Harriman, Tenn., President, is reported as saying that the company is now building the 60-mile section between Monterey, Tenn., and Harriman, and that in six months the trains will be running between Nashville and Knoxville. Rails are going down at the rate of 10 miles per month. The company has a contract with the Carnegie Co. for five steel bridges, work on the first of which will be begun July 15, over a deep gorge west of Rockwood. After that a bridge will be started every month. Surveys are under way from a point near Crossville via Woodbury, Sparta, Murphreesboro and Nashville to Clarksville. Naugles, Holcomb & Co. of 335 Dearborn St., Chicago, have the general contract, a portion of which is sublet. (June 2, p. 394.)

TEXAS TRUNK.—While no authoritative information is at hand, it is believed extremely probable that building will be begun within the year on the extension of this line from Cedar, Tex., south about 185 miles to Rocklin. Under the consolidation of the T. T. and the Texas & New Orleans the two companies were required to build only 50 miles a year.

TRINITY VALLEY.—This company was incorporated in Texas June 15, with a capital stock of $100,000, to build a railroad from Dodge, on the International Great Northern, to run southeast about 90 miles to Beaumont. Among the incorporators are T. Carey, C. M. Carey and D. J. Young.

ULSTER & DELAWARE.—The new standard gage line on the Stoney Clove Division from Phoenicia, N. Y., to Kaaterskill, was opened June 26. (May 26, p. 380.)

New surveys are in progress for the extension from Bloomville, N. Y., northwest about 20 miles to Oneonta. Grading is in progress. (May 19, p. 360.)

UTAH & PACIFIC.—The company has laid track to within five miles of McCune on the Utah state line. The road is to run from Milford, Utah, southwest 75.5 miles to McCune, and from there is projected under the charter of the Utah, Nevada & California, southwest 450 miles to Los Angeles. (April 28, p. 305.) A. W. McCune of Salt Lake City, Utah, is President. (Official.)

VERA CRUZ & PACIFIC.—Proposals will be received up to Aug. 31, at the office of the General Superintendent and Chief Engineer, Cordova, State of Vera Cruz, Mex., for clearing, grading, masonry, track laying, etc., for about 200 km. (124 miles) between the Paloapam River, Santa Lucrecia, and the National Tehuantepec. It will be let either as a whole or in sections of 50 km. Work is to be begun not later than Oct. 31. (March 3, p. 162. See also our advertising pages.)

VIRGINIA & SOUTHWESTERN.—This company is now building the following lines: From Elizabethtown, Tenn., to Stoney Creek, 16 miles; the Lovelady Gap extension, 3.5 miles; the Big Stone Gap extension, 1.5 miles. (Official.)

WABASH.—The Quincy, Ill., City Council, on June 19, passed an ordinance granting this company right of way through certain streets of the city to the site for a passenger depot.

WASHINGTON RUN.—This company has completed 2½ miles from Star Junction, Pa., toward Layton, on its extension to the Washington Coal & Coke Company's mines, 4½ miles. It is building five miles additional of main track, and six miles of terminals under Bennett & Talbot of Greensburg, Pa., contractors. (March 31, p. 236.) W. Harry Brown, Conestoga Bldg., Pittsburgh, Pa., is President. (Official.

WAYCROSS AIR LINE.—The extension of three miles from Douglas, Ga., to Ashley is completed. (Dec. 16, 1898, p. 904.) The company proposes to make a further extension of 50 miles to Cordele. (Official.)

WINONA, MARSHALLTOWN & SOUTHERN.—Surveys are already completed awaiting the action of interested parties on this line, from Osage, Ia., south 180 miles to Chariton. (March 17, p. 198.) N. S. Ketchum of Marshalltown, Ia., is President. (Official.)

WYOMING SOUTHERN.—This line has been surveyed for its entire distance from Fort Steele, Wyo., south 28 miles to Saratoga. Twenty miles of the line was graded by the Union Pacific in 1890. It will require about five steel or iron bridges. The officers are given under Elections and Appointments. (June 23, p. 492.)

GENERAL RAILROAD NEWS.

BIRMINGHAM SOUTHERN.—The Tennessee Coal & Iron Co., on June 22, ratified a contract of sale of this property to the Louisville & Nashville and the Southern. (June 2, p. 394.)

BOSTON & ALBANY.—It is reported that the New York Central & Hudson River is to take a 999 year lease of this property on guarantee of eight per cent. per annum to the stockholders. This is the dividend which has been received by the B. & A. for some years past. Should this lease be ratified, the N. Y. C. will add to its mileage some 389 miles. The capital stock is $25,000,000, and the funded debt aggregates $7,485,000.

BUSK TUNNEL.—The Colorado Midland has bought outright this tunnel for $1,250,000. It is about five miles long and was built for the use of the C. M., but was included in the reorganization of that property. (June 16, p. 440.)

CEDAR RAPIDS, GARNER & NORTHWESTERN.—An amendement to the articles of incorporation of this company was filed in Iowa June 20, increasing the capital stock from $250,000 to $350,000. This line runs from Garner, on the Burlington, Cedar Rapids & Northern, northwest 28 miles to Titonka, and was completed last year. (Jan 13, p. 33.)

CHICAGO & ALTON.—A meeting of the stockholders is called for Sept. 7 to vote on the proposition to increase the capital stock from $22,230,600 to about $40,000,000, in order to obtain money for new improvements. It is also proposed to adopt measures for refunding bonds. (May 19, p. 361.)

CHICAGO, INDIANAPOLIS & LOUISVILLE.—Application has been filed at Indianapolis, Ind., for the appointment of a receiver on the ground of the recent decision of the United States Supreme Court, which set aside the order of the lower courts affirming the sale of the property of the old company, the Louisville, New Albany & Chicago. (June 9, p. 418.)

COLORADO VALLEY.—Judge W. R. Smith of the Sweetwater Judicial District (Texas), has confirmed the sale of the property to Thomas Tramwell, R. L. McCaully and A. J. Long, as trustees for the first mortgage bondholders. The new owners propose to reorganize at once under a new charter and to complete the line from Sweetwater to San Angelo. It was sold by order of the court on June 6. (June 23, p. 462.)

EMPIRE RAILROAD & COAL MINE.—C. L. Wilson, of Antioch, Cal., has bought this property, which includes several coal mines and a railroad ten miles long from the docks at Antioch south to the coal mines. This property has been lying idle for several years, but Mr. Wilson writes that there is a demand at present for the cheap coals which his mines produce.

KOOTENAY RAILWAY & NAVIGATION.—This company has filed a mortgage for £480,000 on its new line, now building from Bonner's Ferry, Id., north to the southern end of Kootenay Lake, B. C.

LEBANON SPRINGS.—Justice Chester, at Albany, N. Y., has authorized Elnathan Sweet, Receiver, to sell this property to recover $22,000 due on Receiver's certificates issued to the Hilton Bridge Construction Co. The road has been in the hands of receivers since 1888. (May 12, p. 345.)

NORTHERN PACIFIC.—Pursuant to the decree of the United States Circuit Court for the Eastern District of Wisconsin, on May 25, Albert L. Cary, as Special Master, will sell at public auction all the lands granted by Congress to the N. P. Co. in Minnesota and Wisconsin. The Minnesota sales will take place at the various county seats at dates between July 17 and August 5. It is probable that the lands will be bought in for the new N. P. Co., under the large deficiency judgment of $86,911,600 obtained last year. These lands comprise some 3,738,874 acres unsold. (Oct. 7, 1898, p. 734.)

OREGON PACIFIC.—Judge Wallace, in the United States Circuit Court of New York, on June 22 handed down a decision sustaining three out of eight demurrers filed against the Farmers' Loan & Trust Company, New York, as trustee, under the $15,000,000 mortgage of 1880, in which it is held that the company need not account for the $15,000,000 of bonds issued by the old company, now the Corvallis & Eastern. (March 17, p. 200.)

OTIS.—This company was incorporated June 26 in New York State, with a capital stock of $65,000, as successor to the Otis Elevating, sold April 18 under foreclosure to the bondholders. The directors are: Alfred Van Santvoord, 38 West Thirty-ninth St., New York; Wm. D. Baldwin, 71 Broadway, New York; Chas. L. Rickerson, 54 Harrison St., New York; Geo. M. Snyder, West Hoboken, N. J.; Wm. H. White, Jr., 71 Broadway, New York. (April 28, p. 307.)

ST. LOUIS, IRON MOUNTAIN & SOUTHERN.—The stockholders on June 26 voted unanimously to increase the capital stock by $40,000,000 and the bonded indebtedness by a like amount. These additional securities are for improvements, additions, branches and extensions, to retire old bonds and to acquire the securities of subordinate companies. (June 2, p. 394.)

ST. LOUIS & NORTHERN SHORT LINE.—The lease of terminals from the Chicago Terminal Transfer made by the St. Louis, Peoria & Northern, now the St. L. & N. S. L., has been so modified that the company will receive from the Chicago & Alton $96,000 per annum until 1903; $105,600 until 1909, and $150,000 thereafter, in addition to taxes and cost of maintenance. Under the old contract the Terminal Company was to receive $150,000 from July 1, 1910, and a cash payment of $880,000 in commutation of the rental prior to that date. (Nov. 11, 1898, p. 822.)

ST. LOUIS, INDIANAPOLIS & EASTERN.—The United States Circuit Court at Springfield, Ill., on June 14 approved the decree of foreclosure and order for sale of this property on the first mortgage bonds, which, with default of interest, now amount to $1,169,814. The property was transferred to the Illinois Central March 25. (May 12, p. 345.)

ST. LOUIS SOUTHWESTERN.—An interest payment of 2 per cent. (the first) has been declared on the $9,000,000 second mortgage income bonds, payable July 1.

SIOUX CITY, O'NEILL & WESTERN.—J. Kennedy Tod & Co., of New York, on June 30 takes possession of this property in the name of the bondholders, for whom it was bought on May 26. It is to be renamed the Sioux City & Western and to be operated by the Great Northern. (June 23, p. 462.)

SIOUX CITY TERMINAL.—The sale of this property has been set at foreclosure for Sept. 1, at Sioux City, Ia. It is controlled by the Sioux City & Northern, and went into the hands of receivers Oct. 10, 1893. (June 9, p. 418.)

UNION PACIFIC.—The United States Government has filed a bill in equity in the United States Circuit Court, at Boston, against the American Loan & Trust Co., to recover all or a portion of $570,000 received by the Trust Co. from the sale of certain securities deposited with it to secure the creditors of the Kansas Pacific, now part of the Union Pacific. Under the foreclosure sale of last year the Government failed to receive the interest advances made on the old bonds. (Kansas Pacific, Feb. 25, 1898, p. 150.)

WASHINGTON & FRANKLIN.—The stockholders of the W. & F. and the Hagerstown & State Line, on June 26 ratified the proposition to consolidate the two properties under the W. & F. (June 23, p. 462.)

WHEELING & LAKE ERIE.—Stockholders of the W. & L. E., representing over 80 per cent. of the stock, at Toledo, on June 26, voted to issue $15,000,000 of 4 per cent. bonds to retire car trust bonds, and to buy the Cleveland, Canton & Southern and the Cleveland Belt & Terminal lines. (C. C. & S., May 26, p. 380.)

WISCONSIN CENTRAL.—The holders of various securities under the reorganization plan are asked to deposit them not later than July 11, paying the assessments in full. (June 16, p. 440.)

TRAFFIC.

Traffic Notes.

Another Texas grand jury has indicted a Northern shipper for violation of the Interstate Commerce Law in giving a wrong description of freight shipped to Texas.

The Southern Pacific, which has a new passenger traffic manager, announces at San Francisco that round-trip tickets will be sold to the Christian Endeavor and Epworth League conventions, which are to be held in Detroit and Indianapolis next month, at half rates plus $2. This is the first time that so great a reduction has ever been made from California.

At Indianapolis, where the movement of freight cars, loaded and empty, is counted up every week, the total for the week ending June 17 was 27,113 cars, of which 21,453 were loaded. This is the largest record ever made at this time of the year, and it is said to reflect a very active condition of business throughout a large territory.

Two ticket brokers of Cincinnati have sued the Cleveland, Cincinnati, Chicago & St. Louis for $25,000 each, this being the sum which plaintiffs claim to have suffered by the action of the railroad company in securing the passage last year of an ordinance by the city government imposing severe restrictions on the business of ticket brokerage.

Export Grain Rates.

F. S. Rutherford, a St. Louis grain shipper, commenting on the evidence taken by the Interstate Commerce Commission at Chicago and St. Louis, says: Charles Counselman is said to favor a lower rate on grain for export than when for domestic consumption, despite the fact that he is an elevator owner himself. In the light of developments at the hearing in St. Louis, it is not to be marveled at that a Chicago elevator owner should favor the lower export rate. The representative of the Rock Island road testified at St. Louis that the greater portion of the grain moving from points on their lines was billed to Chicago for export, taking a rate of 1.8 cents per 100 lbs., from the Mississippi River to Chicago on the export billing, as against a rate of 5 cents when billed as domestic shipments. The Rock Island further admitted that this export billed grain went into elevators at Chicago, that his road lost track of it after unloading into elevator, and that so far as they knew it could be used for domestic purposes, though going to Chicago on a basis of export business. It is this opportunity afforded for manipulation that calls forth the greatest antagonism manifested by the general trade against the export rate on grain. It is such manipulation that has deprived St. Louis of a large share of western grain.

Chicago Traffic Matters.

Chicago, June 28, 1899.

After balloting on the question for nearly a week a chairman for the Western Passenger Association, to succeed B. D. Caldwell, has been elected. E. E. McLeod, Assistant General Passenger Agent of the Chicago, Rock Island & Pacific Railway, has been selected for the place. The election was made by a committee consisting of Mr. Eustis, of the Burlington; Mr. Sebastian, of the Rock Island; Mr. Kniskern, of the Northwestern; Mr. Nicholson, of the Atchison, and Mr. Heafford, of the Milwaukee. This committee was appointed by the executive officers to select a man. There were a number of candidates, and up to the last day of the committee's meetings Mr. McLeod's name was not mentioned. No better man could have been chosen for the position. Mr. McLeod is one of the younger officers of the western railroad world, and has been with the Rock Island for a number of years. He has no enemies, nor any axes to grind.

Freight officers of the roads leading to the South with freight rates. The Grand Trunk started it by reducing its corn and oats rates from Chicago to the seaboard. This was followed by a meeting of the other eastbound roads, at which it was unanimously agreed to meet the Grand Trunk by reducing the rates to New York on oats to 13 cents and on corn 11; to Boston, oats 15 and corn 13 cents, and to Philadelphia, oats 11 and corn 9 cents. This is a cut of 4 cents per 100 lbs. on oats and 6 cents on corn. Following this came the announcement that all the eastbound lines would reduce the export provision rate from Chicago to New York from 22½ cents per 100 lbs. to 20 cents. The fight has temporarily quieted down, but new reductions are looked for any day. Passenger rates are only a shade better than freight. The Erie has given notice that it will put in a round-trip rate from Chicago to Boston for summer tourists of $33.50, to remain in effect from July 1 to Sept. 30. The Michigan Central, the Wabash and the Nickel Plate will meet this reduction, and it is now expected that the Erie, which is fighting for a differential on this business under the Michigan Central, will go under the $33.50 rate.

Freight officers of the roads leading to the Southwest are puzzled as to what course to pursue to meet the competition of the Kansas City, Pittsburgh & Gulf, and Morgan and Mallory line steamers in rates from New York to the Southwest. The general freight agents of these lines are now in session in Chicago, trying to adopt some plan of action against the Gulf line. The latter now has in force a rate of 80 cents (first class) from New York to Missouri River common points. The lowest scale to this territory from New York by canal and lake to Chicago and rail to the Southwest is $1.10.